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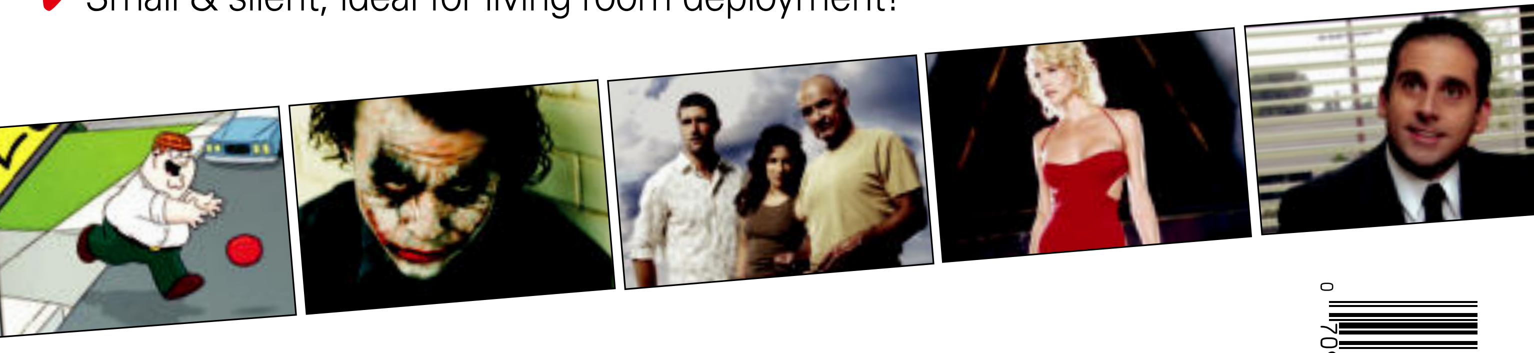

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MAXIMUM PC

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Future plc is a public company quoted on the London Stock Exchange (symbol: FUTR).

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Maximum PC ISSN: 1522-4279

Screw Heat Vision, I Want Google

As I write this, I'm sitting in seat 17F. My air speed is about 517mph, and I'm 35,146 feet above Limon, Colorado. Last year, this would have been a boring five-hour plane ride. This year, my hours in the air feel no different than kicking back at home on a rainy Sunday afternoon. I'm on a computer, farting around on the Internet. And while that's undoubtedly nice, I really want—no, that's not right—I *need* more.

You know the question everyone always asks: "If you could choose one superpower, what would it be?" The unimaginative types say they want an adamantium skeleton or X-ray vision, but I'm not interested in "classic" superpowers. I want instant brain-level access to the Internet. I want to know everything there is to know about everything—or at least have that information available at the speed of Google*. And I want all the relevant info at any given time displayed in a context-rich overlay on top of whatever I'm actually looking at. That's not too much, is it?

Sure, I can approximate that experience today by whipping out my trusty iPhone and hitting the net, but that still takes too long. I've got to extricate the phone from my pocket, turn it on, open the browser, then type my query. Taking a few minutes to get the answer to a simple Google query is too long for me. The funny thing is the problem isn't bandwidth, it's the formfactor. The hardware needed to make this happen is here, but it's not been combined, Voltron-style, into the perfect device.

In the meantime, there's got to be a better formfactor for mobile Internet devices. While I love having Internet functionality integrated in a phone, maintaining a balance between portability and utility is tricky—the device needs to be small enough to fit in a jeans pocket but still include a big, Internet-friendly screen. Much-maligned display glasses could help close the gap, but there's probably even better tech than that waiting in the wings.

I'll keep my eyes peeled for new hardware, but until it arrives, how do you cope?

MORE AWESOME INSIDE!

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page 22

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page 40

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MORE CH-CH-CH-CHANGES

In this issue, you'll see two departments missing from the magazine. First, in an effort to reduce overall "department clutter" and streamline the flow of the reading experience, we cut Deathmatch. Second, we cut Watchdog, our consumer advocacy column. This was a tough decision, but the bottom line is that we needed to free up "the dog behind the dog," Senior Editor Gordon Mah Ung, so he can spend more time on reviews. Gordon will still report on consumer issues from time to time, but these articles will appear in our QuickStart section, or online.

* *The speed of Google is roughly one query every 0.18 seconds, or roughly 20,000 queries an hour.*

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THE NEWS

Battle for the iPhone Throne

Palm, Microsoft, and Google (via HTC) assault the smartphone market -ZACK STERN

Apple's iPhone might have the most consumer buzz, but the Palm Pre and Android-powered HTC Magic will soon challenge the king, with Windows Mobile 6.5 devices to follow. Stiff competition in the smartphone market is causing companies to match features while still trying to be distinct.

The Pre and the Magic will include a 320x480-pixel screen and Wi-Fi, just like the iPhone. And all the challengers will try to match Apple's App Store success, offering over-the-air application sales directly on devices. But don't count on Apple to wait for the pack to catch up. The company wouldn't comment on upcoming products, but if Apple's release history is any indication—a pattern has held for OS X, iPods, and Macs—the next iPhone could be just months away.

FAN'S OF GOOGLE'S ANDROID OS WILL LIKE THE MAGIC AS MUCH—OR MORE THAN—THE ORIGINAL G1.

G2 KEEPS ORIGINAL MAGIC

The HTC Magic will be the second smartphone based on Google's open-source Android OS. (That's why it's nicknamed the "G2" by gadgets watchers and might actually be branded that way in the United States.) The hardware will initially launch in the spring through European carrier Vodafone; since a T-Mobile logo showed up on a recent demo of the phone, that company might power the unannounced American release.

The Magic ditches the not-really-a-BlackBerry G1 identity crisis by cutting out the keyboard, leaving a smaller, lighter design. It'll be a bit thicker than an iPhone, but also narrower in width. But other than a video-capable camera and touch-screen-only typing, little else will change. Fans of Google's Android OS will like the Magic as much—or more than—the original G1.

WINDOWS MOBILE 6.5: NEW INTERFACE

Shipping on new phones later this year, Windows Mobile 6.5 revises Microsoft's smartphone interface, adding touch-screen gesture commands. Its biggest update rewrites the home screen as a contextual list, immediately showing recent communications, as well as giving direct access to the most important software.

Also new, the free My Phone sync service will save text messages, contacts, photos, videos, and more online, storing backups and letting you easily make updates on a PC. (Depending on the carrier and device, some Windows Mobile 6.1 handsets will also work with My Phone.)

The updated, gesture-savvy interface, the faster Internet Explorer Mobile, and the cloud-based My Phone seem significant, but Microsoft has already mentioned a 2010 release for Windows Mobile 7. So keep an eye on those plans before buying a new Windows Mobile 6.5 device.

PALM PRE IS PALM'S PRAYER

In what could be the last hope to save the long-ailing Palm, the Pre will launch with its all-new webOS in the first half of 2009. The complete OS overhaul uses common web technologies, including JavaScript and eventually Flash; the idea is for developers to easily create software that will lure customers back to Palm.

The snappy OS has also been designed to pool data from different online locations, consolidating contacts and calendars from Outlook, Google, and Facebook. Additionally, you'll be able to see the same conversation thread with the same person even when communicating across different protocols, such as texts and instant messages.

The Pre hardware will have a smaller footprint than the iPhone in its touch-screen-only mode. However, a slide-out keyboard will aid message composition. But look for webOS to make or break the Pre—and Palm.

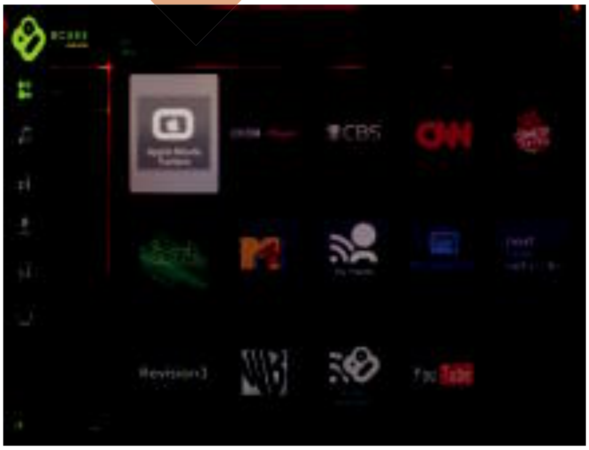
Open sesame. The Palm Pre tries its own slide-out keyboard.

Hulu Pulls Content from Boxee, TV.com

In a move that's sure to bum out TV junkies, online content-portal Hulu has ceased streaming content from its servers to other parties—namely Boxee, the premier social media center application, and online content provider TV.com.

Since the issue doesn't seem to be related to missed ad revenue opportunities—Boxee retains advertisements included with each video—the likely explanation for Hulu's decision might have to do with a quarrel over licensing. In a public statement, Hulu explained that it felt entitled to remove content because it has contractual rights with certain networks and added that it's acting to satisfy the requests of certain content providers.

Boxee states that it will continue to pursue a resolution, while the CBS-owned TV.com will likely seek other licensing arrangements. **–FI**



Once a highlight of the Boxee media center interface, Hulu is now missing from the lineup.

Seagate, AMD Demo 6Gb/s SATA

On March 9, hard drive manufacturer Seagate and chip manufacturer AMD unveiled the first tech demo of the Serial ATA Revision 3, which boasts transfer rates of up to six gigabits per second, twice the speed of the current SATA spec. The specification, which was announced by the Serial ATA International Organization last August, will appear in hardware starting later this year. The new revision is entirely backward-compatible and utilizes the same connectors and cables as current-gen SATA devices. SATA 6Gb/s comes several years before Seagate estimates it will be needed for standard hard drives, but we note that several current-gen SSDs are already bumping against the 3Gb/s limit of the current spec. **–NE**

The Pirate Bay's Day in Court

On February 16, four men affiliated with The Pirate Bay, one of the largest torrent trackers on the Internet, went on trial in Sweden to face charges of commercial copyright infringement. The four men—three founders of TPB and a man accused of aiding them financially—pleaded not guilty to the charges brought by international recording industry group IFPI on behalf of music and film industry plaintiffs, including Warner Brothers, 20th Century Fox, Sony BMG, and Universal. Half the charges were dropped on the second day, and the trial ended March 3. The judge's decision, which could have a profound effect on the future of file sharing (legal or otherwise), is expected April 17, but the fight will no doubt continue. **–NE**

FAST FORWARD

Fretting over Netbooks

The recession is getting so bad that stock market refugees are snapping up Treasury bills at 0.2 percent interest, and car dealers have tried everything but adding immortality to their option packages. So you would think that a hot-selling product would be universally welcomed.

Netbook computers are a rare bright spot in a dimming economy. They're selling faster than copies of *Foreclosure for Dummies*. The Asus Eee PC opened the door. Now there are too many to count.

However, critics say netbooks might be a bad thing. Their reasoning is that most netbooks use Intel's Atom processor, which costs less and has lower profit margins than Intel's other mobile processors. Atom's popularity, they say, might actually hurt Intel and drag down profits for system vendors and their suppliers.

Enough of that. Netbooks are a good thing. In the first place, market surveys indicate that netbooks aren't displacing notebooks. Most buyers either have a notebook already and want something more portable, or they weren't considering the purchase of a mobile computer at all until netbooks came along.

Of course, the surveys could be wrong or premature. I'm sure some people are bypassing traditional notebooks for smaller, lighter netbooks. But the choice isn't easy, because most netbooks aren't much cheaper than full-featured notebooks with superior screens. Intel, genetically paranoid, is carefully positioning netbooks as less-capable machines suitable for casual email, web browsing, and social networking. When Nvidia recently tried to expand the scope of netbooks into gaming by introducing a chipset with better graphics, Intel responded with aggressive countermarketing. Intel is also trying to limit the screen sizes of netbooks.

It's inevitable that netbooks will cannibalize sales of larger computers to some degree. Computing is going mobile, a trend no one can stop and that wise companies will exploit. Intel is promoting a "new" class of mobile Internet devices (MIDs)—basically, PDAs reborn. Intel is also pushing Atom into smartphones.

The success of netbooks, Apple's iPhone, and wireless networking show that people want the Internet wherever they go. If larger notebooks can't make the grade, too bad. Resistance is futile.

Tom Halfhill was formerly a senior editor for *Byte* magazine and is now an analyst for *Microprocessor Report*.

Intel Details 32nm CPUs

Hexa-core and dual-core versions planned

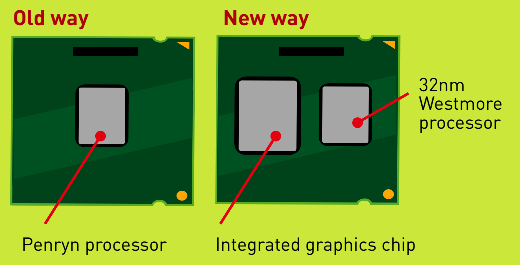
INTEL'S NEXT-GENERATION process could be introduced as soon as this year—but it won't be enthusiast PCs that get it first.

Instead, Intel will first push out its "Westmere" 32nm chips in a budget dual-core CPU code-named Clarkdale. The new CPU will have only dual-channel RAM support and slot into a new socket dubbed LGA1156. Clarkdale will have Intel's latest graphics chip inside the CPU package, near the execution core. The GPU and CPU will connect via a high-speed QPI link, and, interestingly, the memory controller will reside in the GPU, not the CPU. With the CPU package containing PCI-E, GPU, and memory controller, only mundane I/O is left to the south bridge.

Enthusiasts won't get to bite at the 32nm apple until early next year when the hexa-core Gulftown is released. There's very little information on Gulftown, but the good news is that it should slot into current LGA1366 motherboards. Intel's continued support of the tri-channel LGA1366 is heartening to folks who thought Intel would ditch LGA1366 once its budget LGA1156 CPUs arrive.

Between Gulftown and Clarkdale, Intel will release a 45nm quad core code-named Lynnfield. Like Clarkdale, Lynnfield will be Socket 1156 and support dual-channel DDR3, but the chip will have no graphics core.

INTEL'S CLARKDALE CPU



Intel's Clarkdale will give the integrated graphics chip control of the system RAM and connect to the CPU by QPI.

COMPACT COMPUTING

PC in a Plug

Marvell's Plug Computing initiative paves the way for small embedded computers that plug into a wall socket and connect to a home network via Ethernet. Marvell's SheevaPlug platform, for example, is equipped with a 1.2GHz CPU, 512MB of flash memory, and 512MB of DDR2 memory. A USB 2.0 port allows connectivity to other devices, such as external storage. Support for Linux 2.6 kernel distros should accelerate development of software and services. –KS

GAME THEORY

When Scary Isn't Scary Anymore

R*ingu*, the movie that kicked off the Japanese horror craze, scared me as much the third time I saw it as it did the first. It's a moody, unsettling movie that still packs a punch and its signal image of Sadako, a creepy little girl with long dark hair and ashen skin, quickly entered the visual vernacular.

Monolith did a fair job of exploiting elements of J-Horror to create a genuinely creepy FPS experience with FEAR (2005). The developer understood that *Ringu* was successful because a) it used atmospheric, psychological horror to produce unease, and b) relied on fleeting images of horror, glimpsed as if in passing. This, coupled with the relative freshness of J-Horror and its stock images, made FEAR one of the few truly frightening PC games in recent memory.

That FEAR managed to do this in the context of a fast-moving shooter was a well-nigh miraculous bit of design juju. That it ultimately ran aground on its piddling level design (the same rocky shoal that always manages to hull Monolith games) was disappointing, but not fatally so.

Four years later, Monolith is attempting to recapture the magic with FEAR 2: Project Origin. Its failures tell us something interesting about games and movies as creative art forms, namely this: They don't play by the same rules. The best horror movies are scary even when you know all the tricks, *even when you know what's going to happen*. Because you are an objective, passive viewer of an artist's vision, you can be more readily drawn into the inner life of the film.

Games, however, put you *inside* the nightmare, subjectively, actively, and they don't hold up as well. I'm not sure just why, but FEAR 2 drives the point home with a vengeance. It is a perfectly fine shooter, but the frightening effects that worked in the first game simply fail to scare anymore.

Perhaps this failure has something to do with subjective/objective differences. But part of me fears it has more to do with the gamer brain being hardwired to demand constant change and new experiences. If that's the case, then we will, eventually, reach the bottom of the bag of tricks, when there's nothing left to scare or thrill.

Thomas L. McDonald has been covering games for 17 years. He is an editor at large for *Games* magazine.

BlueLounge Sanctuary

The charger problem plagues all geeks. What to do when you have a media player, phone, Bluetooth headset, portable gaming device, eBook reader, and more vying for a few electrical outlets by your nightstand? You could buy an unsightly power strip (or three) and simply learn to love the snarl of cables, or you could purchase a BlueLounge Sanctuary ($150, www.bluelounge.com). It's a little pricey but includes support for 1,500 different devices using the included power connectors. If your device isn't supported but charges using a USB adapter, that works too. The Sanctuary packs all that into a tasteful, wife-friendly wooden box. –WS

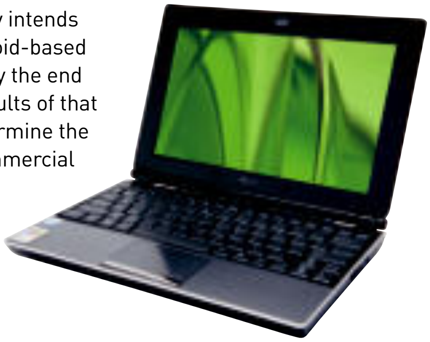
Asus Developing Adroid-Based Netbook

Google's portable OS could challenge Microsoft's dominance

Microsoft Windows' hegemony in the netbook market is currently unimpeachable. Contrary to conjectures and forecasts, Linux has failed to take control of the netbook market, a segment tailor-made for it. But can an entirely new Linux-based OS reverse the trend?

Taiwanese company Asustek is said to be developing a special version of Google's free Android OS for its netbooks. According to Samsun Hu, head of Asus' Eee PC division, the company has dispatched a team of engineers to the task.

The company intends to have an Android-based netbook ready by the end of 2009. The results of that project will determine the viability of a commercial product. –PC



Intel Sues Nvidia over License

Does Nvidia have a license to build chipsets for Intel's Core i7 CPUs or not? That's the question Intel has asked a Delaware court to settle.

The dispute is simple: Ask Intel if Nvidia can build a Nehalem chipset, and the company says it is still in discussions over a license. Ask Nvidia if it has a license, and the company insists, as it has for the last year, that it does.

"We are confident that our license, as negotiated, applies," said Jen-Hsun Huang, president and CEO of Nvidia in a released statement. Huang added, "At the heart of this issue is that the CPU has run its course and the soul of the PC is shifting quickly to the GPU. This is clearly an attempt to stifle innovation to protect a decaying CPU business"— a statement that highlights the chasm between the two companies.

Intel, meanwhile, said all it wants is for the court to determine whether Nvidia has what it claims it has, or whether the company is overstepping its boundaries by telling OEMs it has permission to build for Nehalem. –GU

BYTE RIGHTS

Paradise Lost

This year marks the 10th anniversary of the founding of the much maligned grandaddy of peer-to-peer music piracy, Napster, and the eighth of the music industry's first terrible move.

Napster founder Shawn Fanning didn't exactly invent music file sharing—before Napster, Mac people had Hotline, which, being Mac software, presumably had better fonts, a gorgeous interface, and seven rabid users. What made Napster more than piracy was its many millions of users and billions of downloads. Napster had a population of music fans communicating their preferences and acting as free distributors and archivists, as well as consumers.

It wasn't the 72,000 copies of *Enter Sandman* that made Napster interesting. It was finding out that someone out there had digitized their beloved recording of the TV musical version of *Around the World with Nellie Bly*—some crazy wonderful someone. It's amazing that Napster didn't result in more marriages based on hopelessly obscure tastes. It was the only moment when we could tell what bits of 20th century music people care about today, or had a chance to let tomorrow care about them too.

Shortly after the brief months it took to build the greatest catalog of all time, the Napster library was burned to the ground by a 2001 court decision. Now the vestige of its unified vision of all recorded music decomposes, slowly deallocated on isolated hard drives around the world.

With that foot well shot off, the music industry could turn its attention to suing teenagers for billions of dollars.

That Napster was illegal hardly seems to matter now. Straight-up piracy only spread, though that singular catalog was never matched. Music DRM is increasingly abandoned as a failure, and P2P turns out to be a bandwidth money saver. Had the labels embraced Napster, they might have retained a logistical and popular relevancy in the MP3 era. There was no shortage of ideas on how to do it—subscriptions, compulsory licenses, and so on. In the end, it turns out that the biggest losers in the Napster case, besides the fans of the dulcet Nellie Bly, are the music companies. They shut the door on their one chance at the future.

Quinn Norton writes about copyright for *Wired News* and other publications. Her work has ranged from legal journalism to the inner life of pirate organizations.

THE LIST

Eight UI Inconsistencies That Annoy Us

8 FILE SIZES ARE SHOWN ONLY IN KB

Does your car display its speed in furlongs per week? No. That makes as much sense as showing how many kilobytes a 2.5TB file is.

7

THE PROGRESS BAR IS A COMPULSIVE LIAR

Whether you're copying files or installing patches, the progress bar is always wrong.

6 Application Splash Screens Are Universally Useless

5 OUTLOOK SEPARATES EMAIL ADDRESSES WITH SEMICOLONS

Why?! In America, we separate lists with commas, not semicolons.

4 NEXT/PREVIOUS PAGE CONFUSION

Why does clicking "next" take us to older content, while "previous" takes us to newer content? Talk like a human, not a machine!

3 APPS BURIED IN SUBFOLDERS OF THE PROGRAM MENU!

Apps belong in the root of Program Files, not Program Files/Subfolder/Subfolder, where no one will ever find them!

2 DISABLING SYSTRAY APPS IS HARD

Why bury the option to disable systray apps? It should be as easy to access as the option to hide the annoying buggers.

#1

THE SAVE ICON IS A FREAKIN' FLOPPY DISK!

We haven't owned a PC with a floppy drive in the better part of a decade. Why is the icon still a 3.5-inch disk?

This month the Doctor tackles...

Windows 7 Beta Woes

USB BSODs

Ping Problems

Out with the Old

I am using the Windows 7 Beta and I really like it. However, I am trying to delete my windows.old folder, and it keeps saying I don't have permission from the system to perform that function.

I've turned off UAC completely, restarting in the safe mode, and nothing works. I would appreciate any suggestions, as it takes up a ton of room.

—Kenneth Pletz

Windows provides a tool for just this task. You'll need to navigate to Start > All Programs > Accessories > System Tools > Disk Cleanup. From there, select your Windows drive, and in Disk Cleanup, click "Files from all users on this computer." Select Previous Windows Installation(s), and run the cleanup utility.

Windows 7 vs. iTunes

I installed 64-bit Windows 7 Beta on my machine, and up until this point, I've loved every minute of it. When I did the clean install, I downloaded the latest 64-bit version of iTunes, and everything seemed to be just fine. My old iPod was on the fritz, and it wasn't until yesterday that I finally got around to buying a new iPod Nano and trying to sync it. The problems just exploded from there.

It took me almost three hours to get the new Nano to sync to my library correctly. Finally, I was able to get my music on there, but only on a single sync. Now when I try to make any changes to my iPod through iTunes (e.g., add new album art, sync any podcasts, etc.), it says "syncing iPod" for about three minutes and then I get the error "the iPod 'name' cannot be synced. The required disk cannot be found." Odd, since iTunes still sees the iPod in the devices section.

I have noticed that when I connect my iPod to the USB port, it says "syncing" and then immediately says "disconnecting." Is this just something with Windows 7? Do I need to run a virtual Windows XP in order to get my iPod to work correctly? Thanks for any help, guys!

—Evan Shows

Briefly, it's a Windows 7 problem. Apple iTunes tends to lag behind the curve on new versions of Windows; Vista support took a while, too. And Windows 7 is still in beta. That said, there are a few workarounds. You can try running iTunes within a virtual XP machine, as you suggested. Or check "enable disk use" when your iPod is connected to iTunes; this won't fix your synching problem, but it will allow you to drag and drop music to your iPod. Other than that, there's not much you can do but wait.

Reduce My Ping!

I recently started playing COD4, and at my favorite server, I get a ping of 50–60ms on a 5Mb/s connection. I wanted to get my ping down a bit more, so I upped the connection first to 10Mb/s and then to 16Mb/s, but alas, still no difference. My modem is an older Linksys BEFCMU10, but the router is a newer D-Link 4100 GamerLounge. I'm considering a purchase of a Bigfoot Networks Killer NIC M1 but hate to throw more money at the problem, only to have little or no results. Is there anything I can do to lower my ping? Please help me, Doctor!

—Harquor

Harquor, the first thing you should check is your router's QoS settings. The GamerLounge is programmed to give game traffic network priority, but it wouldn't hurt to double-check. Beyond that, we don't think gaming NIC cards are worth the money, especially since tripling your connection speed didn't help. Don't forget: Server latency depends on a number of factors. Distance is one; all else being equal, you will always get better ping from a server 50 miles from your house than one that's 1,000 miles away. Server-side CPU load and the server's network connection can also negatively affect ping. It may be that 50-60ms is the best ping you'll get from that particular server.

If your USB ports work while using a LiveCD, such as Knoppix, your issue is with Windows, not your hardware.

Universal Serial Bust

I'm having a blue-screen problem on a T42p ThinkPad with 2GB of RAM running Windows XP Pro SP2. This is a corporate laptop issued to

me as a mobile employee, so I have admin rights to it.

Every time I plug a USB device into either of the laptop's two USB ports, it blue-screens. As long as the device is plugged in, the laptop loops through a boot process to a blue screen. Once I unplug the USB device, it behaves. Exceptions: If I put a USB power cable into the ports in the laptop for power only, there is no problem. I have a PCMCIA USB adapter too, and anything I plug into these USB ports works fine.

> ***EVERY TIME I PLUG A USB DEVICE INTO EITHER OF THE LAPTOP'S TWO USB PORTS, IT BLUE-SCREENS.***

This PCMCIA USB adapter has a USB power cable, which I plug into the USB port in the laptop without incident. I have the PCMCIA USB adapter plugged into the PCMCIA slot, with a seven-port USB hub plugged into it running a printer, a wireless mouse, a keyboard, and a hard drive. I have a second hard drive's data cable plugged into the USB hub, while its power cord is plugged into the laptop's USB port, with no problem.

When I called the corporate help desk, they assumed I had a bad motherboard and sent me a replacement laptop. Same problem but worse. The new laptop, which was a 1GB machine, did not recover when the USB port was unplugged. I had to do disc recovery involving file and index cleanup to get it to behave. I went through this several times.

I used the same boot drive, which I had to transfer back and forth, on both laptops.

Fortunately, when I returned the hard drive to the old laptop, it worked the same as it had originally. I have returned the "new" replacement laptop since it did me no good, keeping the original laptop.

I'm to the point of reinstalling the OS, but I don't have access to the corporate image without driving 90 miles, and at this point, I'm leery of just installing a different OS copy, with a different serial number.

—Joe Garza

All right, let's try to isolate the issue. Since you blue-screen on two identical systems with the same hard drive and devices, this could be either a hardware or a software problem. First, unplug all your USB devices, including your PCMCIA adapter, and try plugging them in one at a time. Sounds like you've got a lot of devices going on; you might just be overloading your system, or you have a faulty device somewhere in the mix.

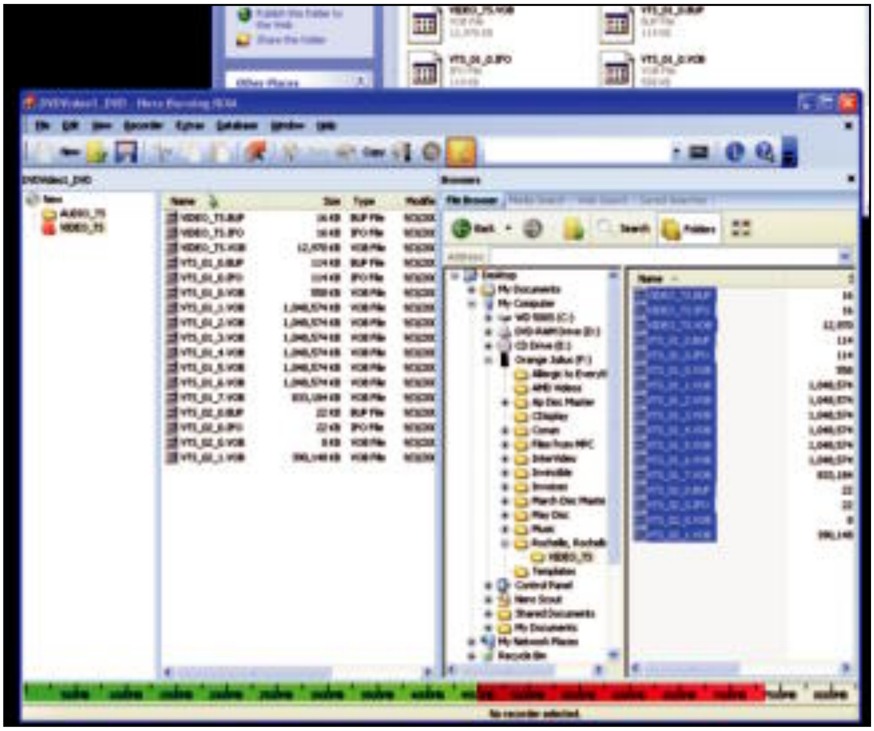
Still blue-screening? It could be a software issue. Try booting from a Linux Live CD (e.g., Knoppix or Ubuntu) and see if the USB ports work. If they do, it's a Windows problem. If your company allows you to install XP's Service Pack 3, do that. If not, reinstall your USB drivers using an XP install disc. If all else fails, you might need to go grab that corporate image. And if that doesn't fix it, and you're sure your plethora of USB devices isn't overloading your machine, it might be time for a new machine.

DVD Backups

The March 2009 article about ripping DVDs was great. However, it left out the part about backing up one DVD movie to another disc. I never trust one copy to remain available when needed, though there seems to be some law of physics such that when I have two or more copies of the same thing around, I can always find both.

—Mike G.

In the process of ripping a DVD, you copy the Video_TS folder from your DVD to your hard drive (using AnyDVD to bypass the copy protection). To copy it back to a physical DVD, start a project in Nero Burning ROM, or some other burning software, select the



Backing up a ripped DVD is as easy as copying its Video_TS folder to a DVD, shown here in Nero Burning ROM.

Video DVD option, then burn that folder and its contents to a DVD disc. Presto!

Can't See, Cap'n!

I bought an Intel Mini-ITX D201GLY2 mobo some months ago and finally got around to putting it all together. 1GB of Patriot DDR2 RAM (automatically underclocked to 533MHz), a 250W PSU, an LG SATA DVD/CD burner, and a 160GB SATA Seagate hard drive. Windows installed without any problems. But when I found the onboard graphics wouldn't display widescreen video, I picked up an ATI Radeon 9250 videocard, thinking this would solve my problems, but it only created more. Before installing it, I went into the BIOS under Video settings and turned off the integrated graphics and switched over to PCI graphics, hit F10, and saved it. When the machine was powered down and unplugged, I hit the power button again to discharge any juice still left in the system before installing the videocard. Once it was installed, I plugged the VGA cable into the card, plugged the AC cable back into the PSU, and powered on the system. Nothing. Just a blank screen with the card installed. I know the card works fine because I have already installed it in another system to test it and had no issues with it. It's only when the card's installed in the mini machine that I get a blank screen. Have you run into this sort of problem before?

—Marcus Jorgensen

It sounds like the motherboard is confused and can't find a video device to initialize. Normally, you do not have to disable the onboard video when you drop in an add-in card; you just put the card in and power up. The Doctor recommends that you reset the CMOS settings. This should bring the board up with the default settings and re-enable either the onboard or PCI graphics card. Try your monitor on both video outputs after you have booted the box. If that doesn't work, you'll want to pull the card and boot the machine. Just because you put the card in doesn't mean that it's the culprit. While mucking around inside your case, you may have jarred a power cable loose, which may be preventing the machine from booting fully. Make sure it properly boots and that you have eliminated other possible problems before putting the card back in.

Where's My Data?!

I recently reformatted my main OS drive. I had copied all of my essential documents to a 1TB Samsung drive. Now that my main OS drive is back in business, I find that the second drive appears to be unformatted. Any time I attempt to access the D: drive, I am prompted to format it. When I boot to my Windows CD, the D: drive appears as a 138GB unformatted partition, with the rest unallocated.

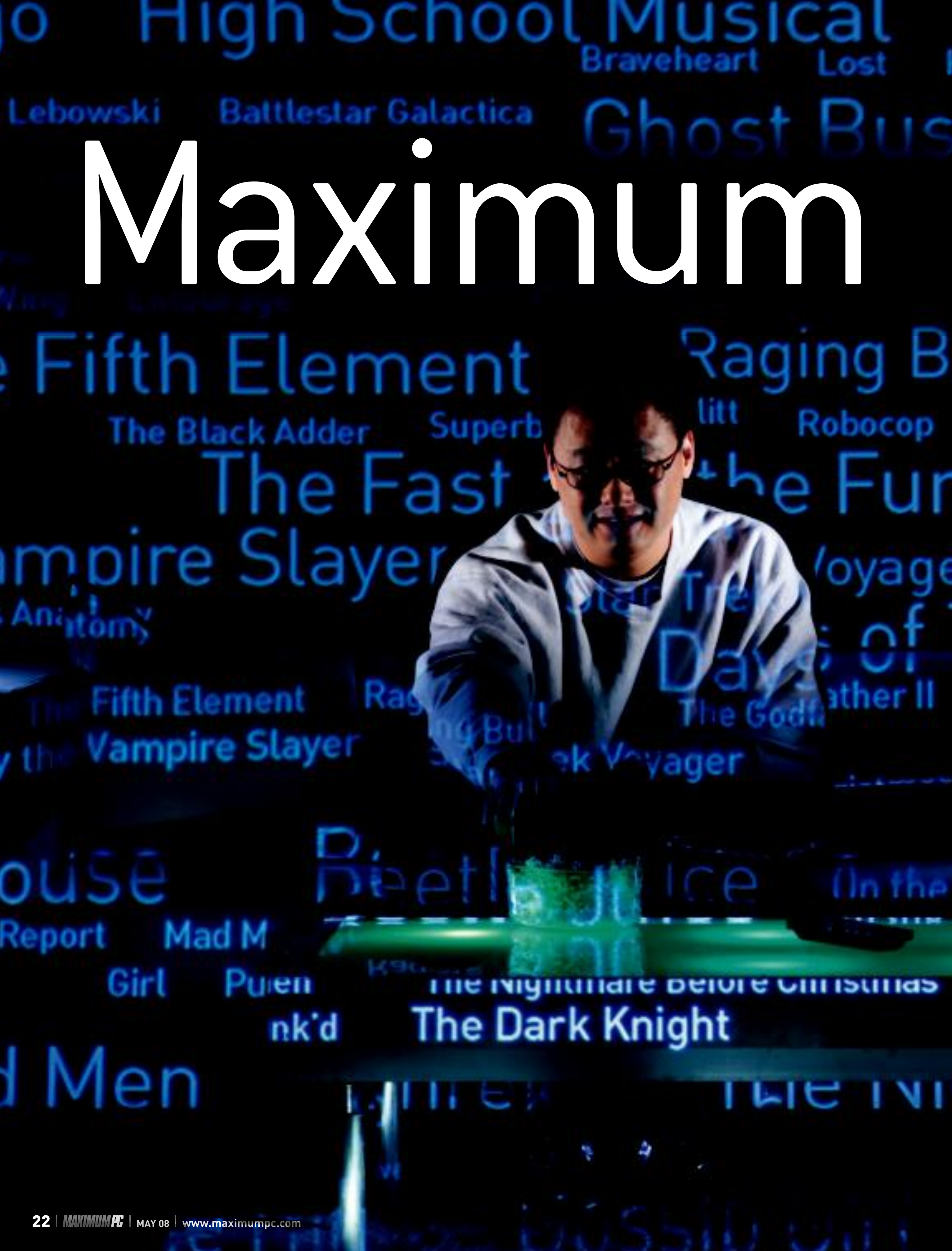
Please, please tell me I have not lost the ability to retrieve all my photos, music, spreadsheets, etc. If I reformat the drive, will I be able to recover the files, using a file recovery app such as Recuva?

—Dave Jarrett

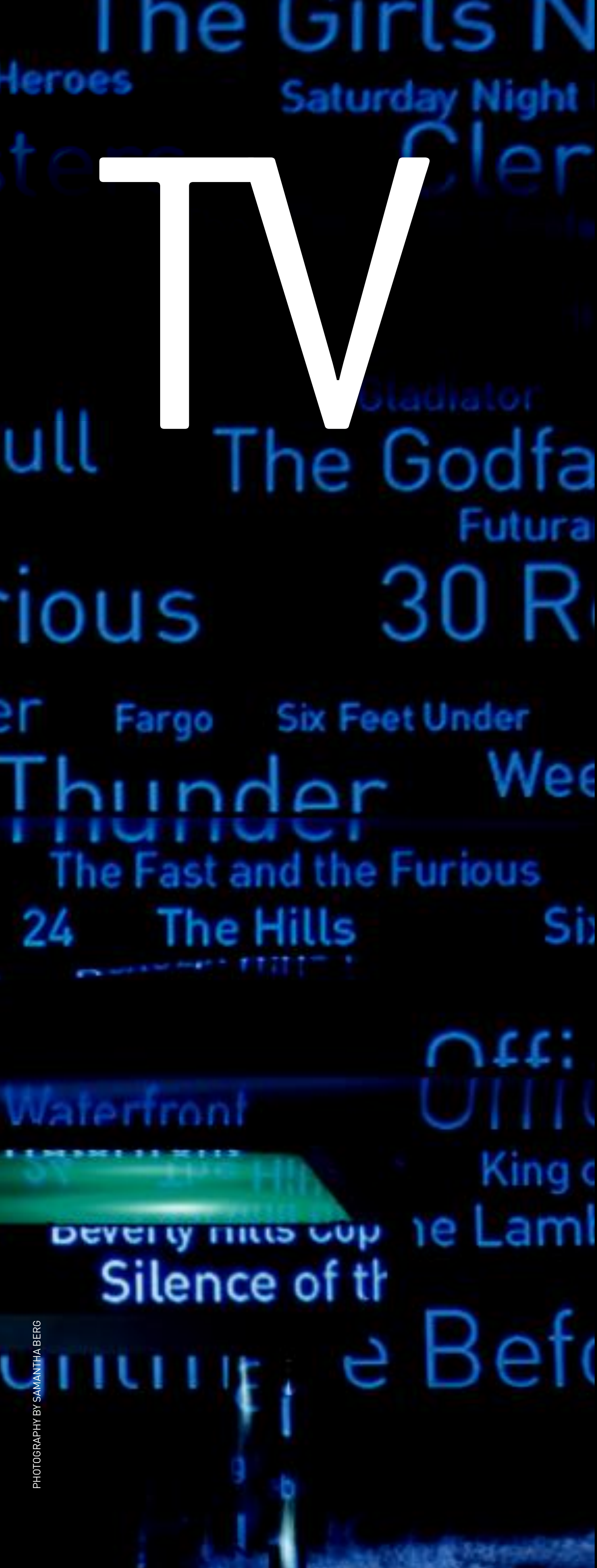
Dave, that 138GB unformatted partition is a dead giveaway. That means your OS or motherboard supports only 28-bit Logic Block Addressing, instead of the modern 48-bit standard. Briefly, LBA specifies where on an ATA disk data is located; 28-bit LBA has room to address only 2^{28} 512-byte sectors, which gives a 137.4GB maximum size. 48-bit LBA support is included in versions of Windows after XP SP1; you should patch XP up to date if that's what you're using. If not, patches are available for Windows 2000, 98, etc. You should also download the most recent chipset drivers for your motherboard. Once you've done this, your partition should reappear.

SUBMIT YOUR QUESTION Are flames shooting out of the back of your rig? First, grab a fire extinguisher and douse the flames. Once the pyrotechnic display has fizzled, email the doctor at doctor@maximumpc.com for advice on how to solve your technological woes.

Maximum


High School Musical
Braveheart
Lost
Lebowski
Battlestar Galactica
Fifth Element
The Black Adder
Robocop
Vampire Slayer
Fifth Element
Vampire Slayer
Report
The Dark Knight
Men

TV



PHOTOGRAPHY BY SAMANTHA BERG

Build the ultimate living room PC and watch all the **TV & movies** the Internet has to offer from the comfort of your couch. We show you how!

BY WILL SMITH

Put down this magazine for a minute and go get your last cable or satellite TV bill. Back? Good. Now skim to the bottom and look at the total amount of money you paid for TV last month. Do you feel like you got a reasonable amount of entertainment for that $60, $80, or even $100-plus? Are you happy about the money you spend for the privilege of watching TV? We're not. The vast majority of TV we watch is available for free, over the air. Sure, we'll occasionally watch an episode of *Flight of the Conchords* on HBO or a documentary on Discovery, but most of the TV we watch is on one of the big over-the-air networks—ABC, CBS, Fox, the CW, and NBC. So we started looking for alternatives.

It turns out that the vast majority of new TV shows are available online, either as part of an ad-driven website like Hulu or TV.com, or available for sale on iTunes or Amazon's Unbox service. However, having a PC in the living room has traditionally sucked. After all, you don't want to hear a big, noisy PC when you're enjoying a movie or a TV show, and using a mouse and keyboard as the primary interface just doesn't cut it when you're kicking back on the couch. But times have changed. These days, it's easy to build a PC that's quiet enough to be virtually unheard, yet powerful enough to play all the high-definition video that's currently available.

And making the proposition even more appealing, there are software front ends that let you harness all that hardware power in an easy-to-use, remote-friendly interface that combines the massive library of streaming video on the web with the DRM-free content you rip from discs or purchase legally on the web. We'll introduce you to a couple of the options, then help you configure our favorite. By combining a few hundred bucks' worth of hardware with a free software app and your broadband connection, you can reduce the money you spend on entertainment from $100 a month to $100 a year.

Picking the Perfect Parts

The ultimate living room PC is a balance between high performance and low power consumption—i.e., it must play high-definition H.264-encoded video while running whisper-quiet

CPU At the heart of your living room PC should be a CPU that sips power, even during demanding tasks, to minimize heat, and thus fan noise. After testing several contenders, we ended up choosing a low-power Phenom 9350e ($200, www.amd.com), which draws just 65W under full load. We considered a dual-core Athlon 64 but decided we'd rather have the extra two cores for transcoding than save 20W.

It crossed our minds to use an Atom or other ultra-low-power processor, but we found that the current single-core CPUs simply don't have the muscle (or enough help from onboard graphics) to play H.264 at 1080p. We had some luck at 720p, but that's not real high-def as far as we're concerned. Perhaps Nvidia's Ion chipset will give Atom a needed lift.

CASE Like our CPU selection, the case must balance two conflicting forces—cooling and noise—all while fitting into a living-room-friendly formfactor. For all those reasons, we chose Silverstone's LC19 ($200, www.silverstonetek.com). Its svelte profile fits perfectly into our entertainment center along with our other components, while muffling the noise so as not to disturb us.

We also like the slightly larger, less expensive Antec Veris Remote ($160, www.antec.com), which isn't as compact or sexy as the LC19, but easier to build in.

MOTHERBOARD After we selected our CPU, we went shopping for a Mini-ITX Socket AM2 motherboard that featured decent integrated graphics. Since we're not playing games, we really just wanted a GPU that would pull a little of the heavy lifting for video decodes off the CPU. The Jetway JNC62K ($150, www.jetway.com.tw) features Nvidia's GeForce 8200 chipset, which is more than sufficient for our needs. It offers analog VGA and DVI/ HDMI (using an adapter), it has a pair of Gigabit Ethernet ports, and its onboard audio features both analog and optical S/PDIF outputs. Honestly, though, any Micro-ATX or smaller board that supports your CPU, includes integrated sound with an S/PDIF output, and sports integrated graphics from Nvidia or ATI will do the job.

STORAGE Your entertainment PC doesn't need a ton of storage—just a few gigs for the OS and the streaming software. (You'll access the content you've ripped or purchased from your desktop PC or server over a network share.) We used a Western Digital Green terabyte drive we had in the Lab, more because of its low rpm than its capacity, which is admittedly overkill for this purpose. You could just as well drop a 2.5-inch notebook drive into this rig. We initially considered running the OS on a CompactFlash card or a USB thumb drive, but having some storage in the box is preferable—if you connect your living room rig using a slow wireless link, you can copy movies to the hard drive before playing them. It adds a few more minutes of prep, but the playback will be buttery smooth despite your hoopty network.

CABLES For very tiny PCs, it's a good idea to have access to short SATA cables with one right-angle connector. Since the cables have a direction, you'll need to get the type of cable that angles down, or you'll have to mount your hard drives upside down. You can find right-angle SATA connectors at pretty much any screwdriver shop or on Amazon, but to find cables shorter than 18 inches, we had to go

MISSING IN ACTION

Why No TV Tuner?

We skipped the TV tuner in our living room rig for one simple reason: We don't need it. While it would be nice to add over-the-air capture to our rig, we'd rather let this machine fall into its sleep mode when it's not being used, rather than running 24/7 to pull all our TV shows from the ether. Combine that with the fact that most HD tuner cards can't pull content from your cable or satellite service, and you'd be spending money just to get the same content you can pull from Hulu.

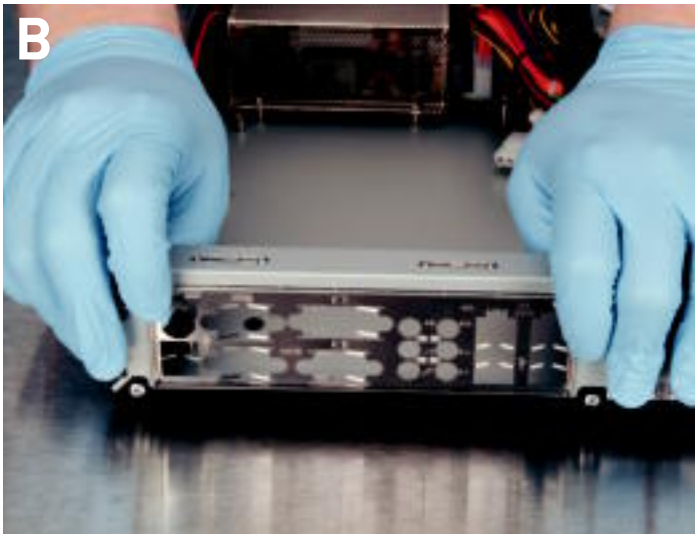
If you insist on hooking your cable box up to your PC, the best way to get HD content into your PC is to use the FireWire interface on your cable box. This will give you high-quality HD video for the content that isn't marked as protected by your cable provider (typically only HBO, Starz, Showtime, and other paid channels are "protected"). Unfortunately, it's incredibly difficult to configure, and it requires special drivers and a ton of hacking. Check out http://tinyurl.com/c2swxz for the full scoop.

Assembling the PC

Building a living room PC is the same as building any other PC, just in an itsy-bitsy case

1 PREP CASE

Before you get started, you'll need to open your case (image A), remove the peripherals that the vendor ships inside the case, and clear any cables. Depending on the case you use, you may need to remove the power supply and drive caddy in order to mount the motherboard. This is also a great time to mount the I/O shield in the case (image B). Line it up with the opening at the bottom of the case, then gently tap it into place using a screwdriver handle or your fingers. Make sure the holes on the shield line up with the ports on the mobo's backplane!



2 INSTALL THE CPU AND RAM

Before you mount the motherboard in your case, you'll want to mount the CPU. For our AM2-based system, all you need to do is lift the socket's locking lever, line up the key pins on the CPU with the appropriate corner of the socket, drop it into place, then lower the lever again.

Next, you'll want to mount the CPU cooler on the CPU. For the living room, the stock cooler that came with your CPU should be sufficient; although, if you're using a low-profile case, it's preferable to use the cooler designed for that specific case. Make sure you use a pea-size amount of thermal grease, or the thermal pad that's pre-applied to your stock cooler, and don't forget to connect the fan's power lead to the CPU fan header on the motherboard.

With just a single memory slot, there's no worry that you'll accidentally misconfigure your dual-channel motherboard. With that in mind, release the retention clips, line up the DIMM, and slide it into place. As with all motherboards, mounting the memory will take more pressure than any other part of the install.

3

MOUNT THE MOTHERBOARD

It's time to mount the motherboard in the case. You should have already snapped the I/O shield into place, so make sure the motherboard standoffs are lined up properly for your motherboard. If you're putting a Mini-ITX board into an ATX case, you'll probably need to move or remove at least one or two standoffs. Once the board is in place, start one screw without tightening it all the way. Once you've started the rest of the screws, you can tighten them all down.

Now is a good time to plug in your power supply and test-boot the rig. While the test-boot isn't necessary for full towers, building inside these tiny home theater cases is such a pain in the ass that we recommend making sure everything works before you go any further. To get started, plug the two power leads into the motherboard, connect the power switch to the power headers on the board, plug in a monitor, and plug in the PSU. Don't worry about connecting drives or a keyboard to the device—we just want to make sure the machine will post. If it doesn't, remove the board, make sure there aren't any extra standoffs grounding the mobo, and reseat your memory before trying again. When your rig boots, move on to the next step.

4

CONNECT THE WIRES

The Jetway motherboard we used has a pair of power connectors. You'll need to connect both the 4-pin ATX 12V connector and the main 20-pin ATX power connector.

The front panel connectors on the Jetway are the same as on any other mobo. As always, watch the polarity on the LED connectors (connect the colored wire to the positive pole on the connector); however, the switches work either way.

Make sure you get the HD Audio connector and your USB headers connected before you put any more hardware in the case. As you start to run cables, it gets really tough to work around the motherboard.

Finally, connect your SATA cables to the motherboard. The Silverstone case gives good access to the SATA ports, even if all the other components are installed, but that's not always the case.

5 MOUNT THE DRIVES

Next, it's time to mount the drives. The LC19 case supports either a 2.5-inch notebook drive or a standard 3.5-inch drive; however, it won't mount like in a typical case. Instead of screwing your drive into a cage, you'll actually screw it into the bottom of the case. The LC19 includes a rubber gasket around the holes, which will help isolate vibration and keep noise from leaving the case. It's a little tricky to mount the drive, though; the best way we found was to flip the case up on its side and hold the drive in place with one hand while starting the screws from the other side (image A). Once you've run all four screws into place, you can put the case back down, and connect the power and the SATA cable.

Next up is the optical drive, although this is a strictly optional feature. The LC19 is designed to work with a notebook optical drive. We picked up a generic slot-fed DVD-RW drive from our local hardware shop, but any one will work. You should be able to find a slim DVD burner at Newegg or Amazon for less than $50. If you're using a PATA drive, you'll also need an adapter (the LC19 comes with one). You can mount the adapter on the drive before or after you put it in the case. It doesn't matter. Slide the drive into the machine, line up the front bezel of the drive with the case, then use the tiny screws that come with the case to lock the drive into place (image B). Connect the PATA cable and power to the adapter, making sure you line up the keyed portion of the ribbon cable.

6 CLOSE THE CASE

Before you close the case, it's a good idea to test-boot the PC once more. Everything should be hooked up and ready to go now, so connect the power brick and power up the PC the first time. Everything works? Great! Close the case and you're ready to connect your living room PC to your TV.

7 CONNECT YOUR TV

There are different ways to connect your entertainment PC to a TV. The best option is HDMI, which carries both a 1080p signal and a high-quality audio signal to your TV and home theater setup. You'll need a dual-link DVI-to-HDMI adapter—if your board didn't come with one, you can purchase it at MonoPrice.com for a few bucks.

Secondary options are DVI for video and Toslink S/PDIF for audio. Most modern TVs include DVI ports, but you'll need a Toslink-to-mini-DIN connector to hook up optical audio to the set. You can purchase one for about $0.75 at MonoPrice as well—search for part number 2671.

Windows and Boxee

Boxee brings web video playback and social networking to a TV-connected PC. Awesome!

By the time you read this, the Windows alpha of Boxee (free, www.boxee.tv) should be public. Boxee is a variant of XBMC—the media streaming and playback software originally designed for the Xbox 1 that now runs on all major platforms—designed with social networking in mind. In addition to many of the streaming and media management features that XBMC has, Boxee includes a friends list and the ability to pull web video from sites like CBS.com, Netflix.com, and CNN.com into the app's sexy 10-foot interface, which makes it easy to browse with a remote control. In its current alpha state, Boxee can be a touch unstable; however, it's so powerful and awesome that we're willing to tolerate an occasional crash to use it.

But first you'll need to install Windows. We've tested Boxee with XP, Vista, and Windows 7 Beta 1. Boxee works great with XP and Vista (including 64-bit Vista) but has problems with Win7 due to the nascent OS's poor OpenGL support. That may change by the time you read this, but for the time being, we don't recommend Win7 for Boxee users.

After you've installed Windows, updated the OS, installed the Nvidia chipset drivers and AMD CPU drivers, changed your display settings to the native resolution for your monitor, and installed the Realtek drivers to enable sound, you should install Boxee. The installer is very straightforward, but there's quite a bit you can do to optimize your experience after the initial install.

First, you'll want to calibrate Boxee's video displays. From the home screen, go left and navigate down to Settings. Go to Appearance, then Screen. Make sure the resolution is set to your TV's native resolution (1920x1080 for a 1080p set, 1280x720 for a 720p set), then click the Video Calibration option. This will walk you through a series of configuration options that will ensure your video is displayed at the proper aspect ratio for your set.

If you have media stored on your machine or network, you can add that content to the Boxee interface as well. In the Settings menu, go to Media Sources. While you can have Boxee connect directly to an SMB share, we recommend mapping a network drive in Windows, then accessing the media through that, as it seems more reliable. Drill down the menus in the Media Sources share and add your content. Boxee will begin indexing it and add it to your machine's library.

Once Boxee is installed, you'll want to point it to your network shares. The easiest way to do that is to map a network drive, but you can also use Boxee's built-in Samba client, as shown here.

And then there's Hulu. As we went to press, Hulu asked Boxee to pull official support for integrated Hulu streaming. Fortunately, within a day of the removal, there were a handful of unofficial plugins for Boxee that bring Hulu back. The plugins are under heavy development, so any instructions we'd give you here will undoubtedly change before you read the issue, but check this URL for the latest update when you're ready to watch: http://tinyurl.com/dfm2pv.

OS ALTERNATIVE

What about Ubuntu?

We tested Boxee with Ubuntu as well and were pleasantly surprised. We had a bit of trouble getting audio configured properly on the Linux OS, but once that hurdle was passed, we had Boxee up and running in no time. The only caveat is that some online sources don't work with the Linux edition of Boxee, so check our handy chart on page 35 to see what does and does not work.

OUTSIDE THE BOXEE

XBMC: An Entertainment Alternative

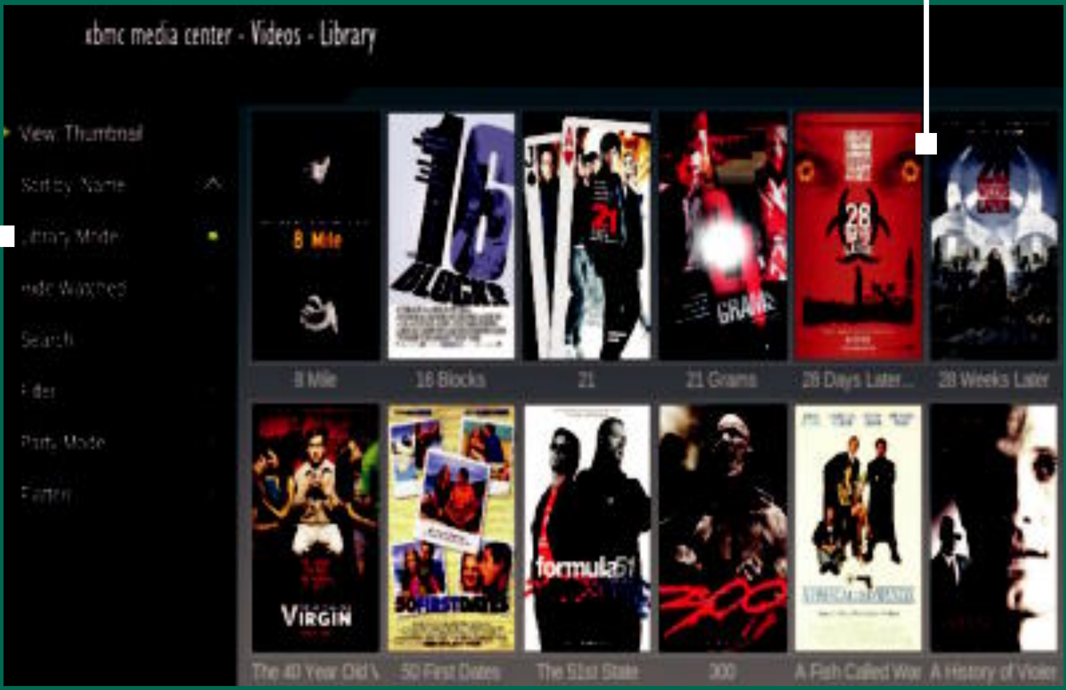
If you're not as interested in streaming web video, XBMC delivers a kick-ass network streaming experience

When XBMC misidentifies a file, you can manually change it using the context menu. Don't fret, though; in our 600-plus file collection, it managed to detect more than 90 percent of the files correctly.

When you mouse over a file, you'll see a small pop-up containing more info about the file. Click it, and you'll see more-detailed info, including release date, actors involved, director, and a basic plot summary.

Library mode is awesome; it lets you browse your movies and TV shows based on metadata, rather than title alone. Best of all, the app automatically downloads art for your films and TV shows!

The only trick to automatic metadata collection is that you store different types of content in different folders. When you add a new folder, you can tell XBMC what type of content it contains (TV show, movie, music, photo, etc.), so it's important that you connect the correct data sources to the correct types of content.



While XBMC lacks the nifty web-based video playback and friends list that Boxee offers, it has a much more advanced streaming platform, especially if you have a large video library. It also offers support for a few streaming sites using plugins, but support for sites like Hulu is nowhere near as polished as it is was in Boxee. If you're not looking to cut your cable, then XBMC is probably a superior choice for in-home streaming.

After you install the app (free, www.xbmc.org), you'll need to configure your video settings using a procedure that's very similar to Boxee's. Simply go to Settings, then Appearance, then Screen, and run through the screen calibration process.

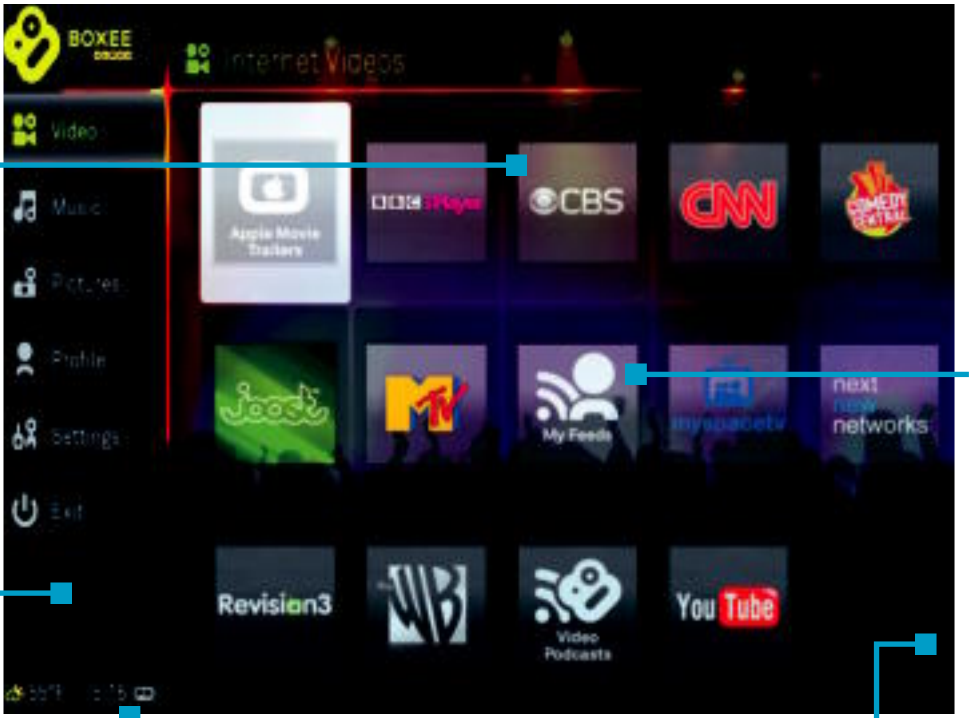
Once that's done, you should hit the audio settings and make sure the proper output is configured. The last thing you should do in your options menu is tell XBMC where your media is stored. As with Boxee, XBMC works better with network sources if you map your network path to a drive letter, then point XBMC to that drive rather than just using the integrated SMB client. You can also add RSS feeds for podcasts or pictures, or UPNP shares if you already have a streaming server set up on your network.

Once you have everything configured, XBMC will scan your content and download metadata associated with your videos. It can take a couple of hours if you have a large collection, but once it's done, you can enable Library mode (using the default skin, it's a left-column option in the Music and Video views). Library mode lets you browse your movie collection by genre, director, actor, year, or a number of other options. Library mode also works for your music collection and lets you browse by the contents of your ID3 tags. It's very handy if you have a lot of movies and music.

Once you've got your media configured, you can also add other streaming sources for sites like Hulu. There are tons of plugins available, and the best place for streaming info is at the XBMC forums (http://tinyurl.com/bkg3km). Enjoy!

A Boxee Tour

Boxee's 10-foot interface is simple to understand, once you know the basic rules



We love that Boxee includes the ability to play content direct from websites—support for individual sites varies by platform, but there's a ton of great content available already, and more being added all the time.

Boxee, like XBMC, will pull down the relevant metadata for your TV shows and movies from the Internet so that you can browse your videos by genre, actor, director, and more.

Want to view video that's not supported by one of the default services? Does the site have an RSS feed? If so, plug it into My Feeds, and odds are you'll be watching streamed video in no time.

Although you can use a mouse with Boxee, the app is designed for navigation with a remote control. To navigate to the main system menu, where you can adjust settings or browse to any of the content accessible to the machine, just browse to the left side of any screen.

If you ever find yourself losing touch with the real world, Boxee will even keep you updated on the current time and local weather. Now that's convenience!

If you navigate beyond the right side of the screen, you'll find Boxee's context-sensitive menus (not pictured), where you can adjust things like view options and thumbnail size.

INPUT DEVICES

Mouse and Keyboard vs. Remote

There are a multitude of possible input devices you can use for your living room PC, ranging from a traditional remote control to a keyboard/mouse combo. The keyboard/mouse is the easiest to set up and lets you fully tap into the massive flexibility of the PC—after all, you can fire up a web browser or iTunes and play any content you can download using a mouse and keyboard. We're especially fond of the DiNovo Media Keyboard from Logitech ($160, www.logitech.com). It's a full-size board, but it has a handy touch pad in the lower right corner, which makes mousing possible.

On the other hand, a more traditional remote control can be mighty handy, especially when you're sitting on the couch. Boxee will work with pretty much any input device, but we tested a couple of Windows Media Center–compatible remotes and found them to work well. You can find a wide variety of Media Center–compatible remotes at Newegg and Amazon; they're usually around $50. Alternately, the Logitech DiNovo Mini ($150, www.logitech.com) is a remote-size clamshell device that includes a mouse and keyboard in a smaller package. It's a little spendy but worth the bucks.

The Final Touches

The machine is built, the software's installed. So what's left to do on our tiny living room PC?

Now that your machine is built and everything's working properly, it's time to put the finishing touches on it. First, you'll want to give a quick tweak to your power management settings. How you configure your machine is really up to you, but we like to set the machine to suspend after an hour or so of inactivity, turn the hard drives off after 20 minutes, and blank the monitor after 20 minutes. It's all optional, but you don't want your PC running when you're not using it. That's just wasteful!

Next, you'll want to make some adjustments to your fan speeds. There are a number of ways to do this, but the easiest is to go into the BIOS's CPU Thermal Throttling menu. Set the CPU full-speed temp to around 70 C, and the idle temp around 55 C. That will run the fan at around 60 percent speed when the CPU temp is below 70 C and crank up only when the CPU temperature goes above that mark. Combined with the Cool 'n' Quiet feature of the AMD CPU, this should help you reduce fan noise in your rig. If you need it to run still quieter, you can always purchase a replacement cooler. We haven't tested many low-profile AM2 coolers, but any AM2 cooler should work with this motherboard.

The last thing you'll want to do is set up Windows to load Boxee (or XBMC, if that's your preference automatically). First, configure Windows to load without prompting for a password. You can do that by following the instructions here: http://tinyurl.com/6t9xh. It's not the most secure way to do things, so we recommend using an account that has low privileges on the rest of your network. Once that's done, all you need to do is drag your Boxee shortcut into the Startup folder on your Start Menu and you should be good to go!

That's all there is to it. Just enjoy!

What Services Work on Each Platform?

	Netflix	Hulu**	CBS	ABC	CNN	Comedy Central	The WB	Joost	MTV	BBC
Windows	✘	✘	✔	✘	✔	✔	✔	✔	✔	✔
Ubuntu	✘	✘	✔	✘	✔	✔	✔	✔	✔	✔
OS X	✔	✘	✔	✔	✔	✔	✔	✔	✔	✔
AppleTV	✘	✘	✔	✘	✔	✔	✔	✔	✔	✔

** Chart reflects availability as of March 1, 2009. New plugin support is being added constantly. * No support via official Hulu plugin. Third-party plugins are available for all platforms.*

OS ALTERNATIVE

Hardware Alternatives for Streaming TV

ASUS EEEBOX PC While the current models are a tad underpowered for 1080p video, they work great for 720p, and newer models promise support for higher-resolution video.

APPLETV Installing Boxee on an AppleTV takes a few minutes and requires only a specially modified USB thumb drive. Once it's installed, you get all the streaming goodness. The AppleTV lacks the hardware chops to play all high-resolution video, however.

NANO-ITX Developments in Nano-ITX formfactors mean that in the future, you'll be able to build a hardback book–size rig that will do everything our pizza box PC can do. We're not quite there yet, but we'll keep you updated as new hardware becomes available.

900 ml
APPROX
800
600
500
DDR3

A MAXIMUM PC CHALLENGE

EXPERIMENTS IN MEMORY

BY GORDON MAH UNG

DDR2 vs. DDR3: Which is better for AMD?

DDR/1066 vs. DDR/1600: Does bandwidth matter?

2GB vs. 3GB vs. 6GB: How much is enough?

RAM, like water, is a commodity. And just as there's a clear difference between putrid L.A. County tap water and water choppered in from the peaks of Mt. Everest, the quality of RAM can vary wildly. But quality is not the sole factor to consider when you're trying to achieve optimum memory performance from your system.

These days, a user is faced with a plethora of options spanning different technologies, speeds, and capacities. We're here to help you make heads and tails of all that so you're prepared when you configure your next rig. Armed with a slew of RAM-based benchmarks, we set out to answer three of the hottest questions in memory today: Is DDR3 for AMD's new AM3 Phenom II CPUs worth the expense? Should you pay for high-speed RAM or stick with the standard stuff? Finally, just how much memory is enough? We test three common amounts of RAM for Intel's new Core i7 to identify the sweet spot.

Intrigued? Then read on.

PHOTOGRAPH BY SAMANTHA BERG

DDR2 vs. DDR3

AMD's new AM3 Phenom II CPUs finally bring DDR3 to the table, but is it worth the price?

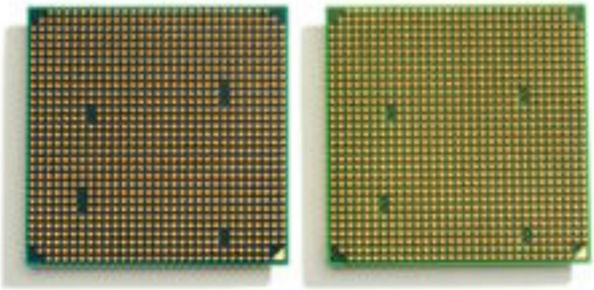
If there's one thing AMD knows, it's how to be fashionably late to a RAM party. Sure, the company showed up early to the DDR dance and was the belle of the ball way back when, but these days, AMD shows up just in time to stack the chairs on the table.

Just as the company lagged far behind Intel in supporting DDR2, AMD has just now—more than a year and a half after its competitor—launched new AM3 chips that support DDR3, although its marketing of the new RAM standard is anything but enthusiastic. In fact, the company maintains that most consumers will prefer DDR2 because of its lower prices. And in a further display of halfheartedness, the company said that if we somehow got a hold of an AM3 board, we could test it, but the company recommended we use DDR2 and an AM2+ board for official Phenom II testing.

Not exactly confidence inspiring, eh? To find out what's behind AMD's blasé attitude about DDR3, we decided to test a 2.6GHz Phenom II X4 810 with both DDR2 and DDR3.

Before we go on, let us explain just how AMD enabled both DDR2 and DDR3 in the same CPU. Generally, CPUs with integrated memory controllers are locked into the type of RAM they support. With Intel, for example, the company decided to support only DDR3 with its new Core i7 CPU. Intel could afford to make the break because there were no legacy Core i7 DDR2 users. With millions of AM2+ boards out there, AMD couldn't burn its bridges, so it built the new Phenom II with both a DDR2 and DDR3 memory controller. Plug an AM3 CPU into an AM2+ board, and the DDR2 controller is activated. Plug it into an AM3 board, and it runs in DDR3. Got it?

The theoretical advantage that DDR3 memory has over DDR2 is the former is capable of deeper data prefetching; DDR3 can prefetch eight bits of data per clock cycle vs. four bits for DDR2. So, let's see how this difference plays out in performance.



Look very closely: A Socket AM3 CPU (on left) has two fewer pins than a Socket AM2+ chip.

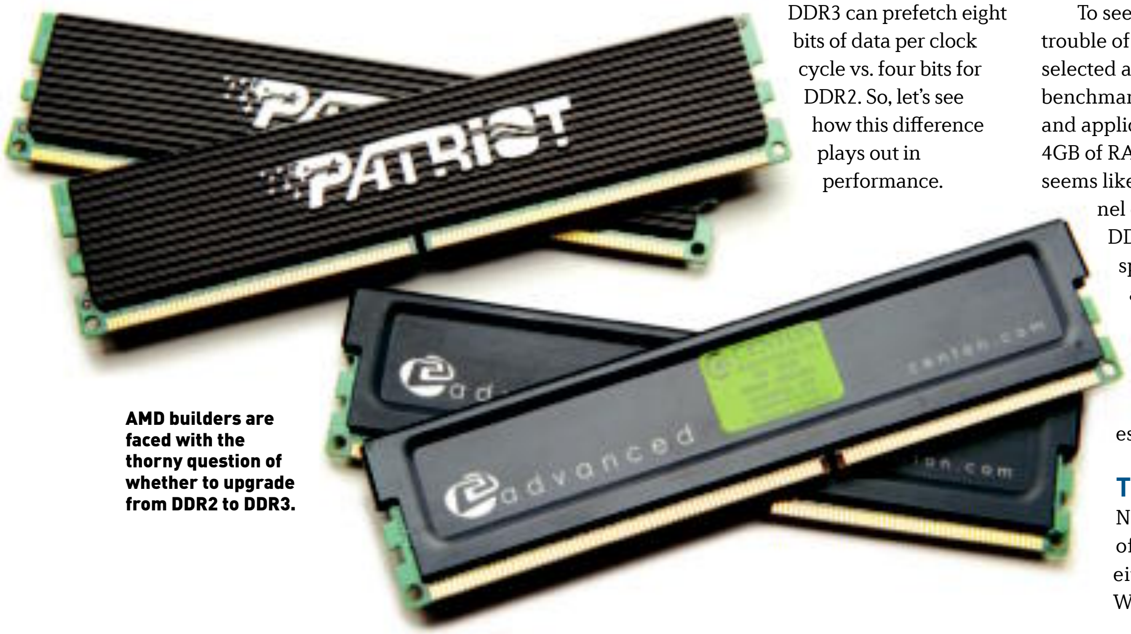
THE TEST

For our testing, we plugged the 2.6GHz Phenom II X4 810 into the AM2+ MSI DKA790GX board. We slotted in 4GB of Patriot DDR2 RAM running at DDR2/1066 speeds. We then removed the Phenom II X4 810 and put it into the new Asus M4A79T Deluxe AM3 board. To this, we added 4GB of Centon DDR3/1333 in dual-channel mode. Both were tested with a GeForce 8800 GTX, an Intel X25-M SSD, and Windows Vista Home Premium in 64-bit.

To see just what you get for the trouble of building an AM3 box, we selected a set of synthetic memory benchmark tests in addition to gaming and application tests. We settled on 4GB of RAM for both platforms, since it seems like the sweet spot for dual-channel configurations. We ran the DDR2 at 1066MHz—the highest speed available—and the DDR3 at 1333MHz. If DDR3/1333 doesn't seem like enough of a spread, we also ran a few spot checks with the DDR3 set at 1,600MHz and found essentially no difference.

THE RESULTS

No difference. That's the story of the day with Phenom II in either DDR2 or DDR3 trim. Well, to be fair, not enough



AMD builders are faced with the thorny question of whether to upgrade from DDR2 to DDR3.

of a difference to write home about. From media encoding to application tests to games, DDR3 seemed to have no impact on performance over DDR2. Even in the synthetic memory benchmarks that push the RAM to its theoretical limits, we didn't see DDR3 make much of a case for itself. That surprised us somewhat, because you can usually count on increased bandwidth to show an improvement in the bandwidth tests. Even with the RAM ticked up to DDR3/1600 rates, the performance increase was minimal in the synthetics. It's no surprise that we didn't see an improvement in the majority of our application tests. PC-Mark Vantage, which stresses various application workloads, actually saw a slight performance decrease from moving to DDR3, but in the synthetic gaming test, 3DMark Vantage, DDR3 pulled ahead by a slight amount.

With these numbers in front of us, we're not surprised that AMD wasn't hot to push us on DDR3 for Phenom III. For AMD fans who have a DDR2-only AM2+ motherboard and are considering chucking it for AM3: Don't bother. At this point, it's just not worth it. You're better off just adding more RAM.

For those looking at a new build of a Phenom II system, the choice is far tougher, but we'd probably lean toward DDR3 and AM3. Sure, DDR2 is cheaper, but DDR3, especially at the lower 1,066MHz and 1,333MHz speeds, isn't going to break the bank. With AMD's current AM3 chips, the DDR3 performance isn't spectacular today, but what if a new spin enhances the performance? We know, it's wishful thinking, but it's probably worth the bet.

BENCHMARKS

	2.6GHz Phenom II X4 810	2.6GHz Phenom II X4 810
RAM	DDR2/1066	DDR3/1333
3DMark Vantage	6,836	**7,378**
3DMark Vantage CPU	27,099	**27,782**
3DMark Vantage GPU	5,472	**5,926**
PCMark Vantage x64 Overall	**5,874**	5,274
Valve Particle Test (fps)	75	76
Quake 4 (fps)	**166.5**	152.2
ProShow Producer 3.1 (min:sec)	13:41	13:53
MainConcept Pro (min:sec)	17:25	17:17
ScienceMark Overall	1,798.18	1,715.89
ScienceMark Membench	9,265	9,188
Sisoft Sandra RAM Bandwidth (GB/s)	12.2	12.6
Sisoft Sandra RAM Latency (ns)	83	83.3
Everest Ultimate MEM Read (MB/s)	8,055	**8,477**
Everest Ultimate MEM Write (MB/s)	6,684	6,629
Everest Ultimate MEM Copy (MB/s)	9,886	9,831
Everest Ultimate MEM Latency (ns)	54.4	53.1

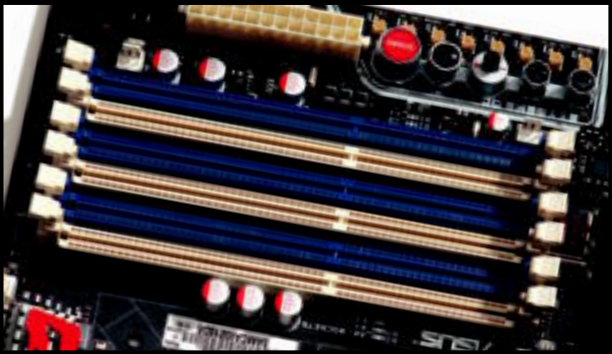
Best scores are bolded.

LOCATION MATTERS

Fill Your Slots Wisely

It's a typical rookie PC move: In the excitement of building your machine, you jam the RAM into any slot available. Unfortunately, that's a practice that can lead to instability or even lower performance.

Here are a few basic tips to help you avoid problems when building any new PC:



With Core i7, fail to use the right slots and the system might not boot.

- Make sure you're running on all channels. Even seasoned system builders can get confused by the RAM coloring schemes on motherboards. Asus, for example, used to require that you put the RAM into slots that were the same color to get dual-channel support on its motherboards. MSI, however, used to do the opposite, so you had to have the RAM in slots that weren't colored the same. This would cause even old salts to pull a brain fart and set a new motherboard in single-channel mode by mistake. The solution is to read the manual before you build the board to find out what the recommended slot config is.

- Put the RAM in the slots closest to the CPU—except when you need to put them in the slots furthest from the CPU. Yup, you got that right. With Athlon 64, Phenom, and Phenom II, it's generally recommended that you use the slots for each channel that's closest to the CPU. For Core i7, it's the opposite. In fact, many motherboards won't even boot if you put the RAM in slots closest to the CPU first. Again, RTFM.

- Avoid the fourth slot. Intel's Core i7-based DX58SO motherboard (reviewed on page 75) features four slots for RAM. You should fill only three of these for tri-channel mode and avoid filling the fourth, since the company says it will impact overall bandwidth. Intel won't be the last to design a Core i7 board with just four slots, so consider yourself warned.

DDR3/1066 vs. DDR3/1600

Before you pay for the extra bandwidth, read this

Despite AMD's statements to the contrary, DDR3 is pretty darn cheap. Yes, DDR2 diehards will scoff, seeing as how you can practically get 4GB of DDR2/800 with a Starbucks coffee, but for those of us who remember paying $500 for 2GB of DDR3 just two years ago, today's DDR3 pricing is a hell of a bargain.

But that doesn't mean you should spend indiscriminately. Besides the typical concerns over quality—name-brand memory is always preferable—users face another question: How much bandwidth is worth the cost?

Before we get too far into this topic though, let's review the basics. Like DDR and DDR2, DDR3 uses double data rate technology, which sends and receives data on both the rise and fall of the RAM's clock—DDR3 just grabs twice as much data as its predecessor. There are two common designations for DDR3: One is the module name, which describes the theoretical bandwidth, as in a PC8500 module or a PC10600 module. These numbers represent the peak transfer rate in MB/s and can become quite confusing. Quickly, tell us the effective data rate of a PC8500 DDR3 module. We're still waiting. Sometimes the module will also helpfully list the effective clock speed—the other common RAM designation—e.g, 1066MHz. But when it doesn't, you can figure out the effective clock speed of a module by dividing the bandwidth by eight. For example, a PC8500 module divided by eight is 1,066MHz, and PC10600 becomes 1,333MHz. Mind you, this is not the actual clock speed, which is 1/8 the effective clock speed. The actual clock speed of a 1,066MHz module is 133MHz. Why all these inflated bandwidth and clock numbers? It's a legacy of the old war with Rambus, when the DDR guys didn't want the original DDR/200 (which ran at a core clock of 100MHz and had a bandwidth of 1600MB/s) to sound inferior to Rambus's PC800, which ran at 400MHz and had a bandwidth of 3200MB/s in dual-channel mode. Thus, the single-channel-only DDR/200 module became a PC1600 module. Voilà, it's a bigger number than PC800! We don't want to pick old scabs, so the take-away is that we prefer to use the nomenclature of DDR3/1066 or DDR3/1600, which is far less confusing and far more useful.

THE TEST

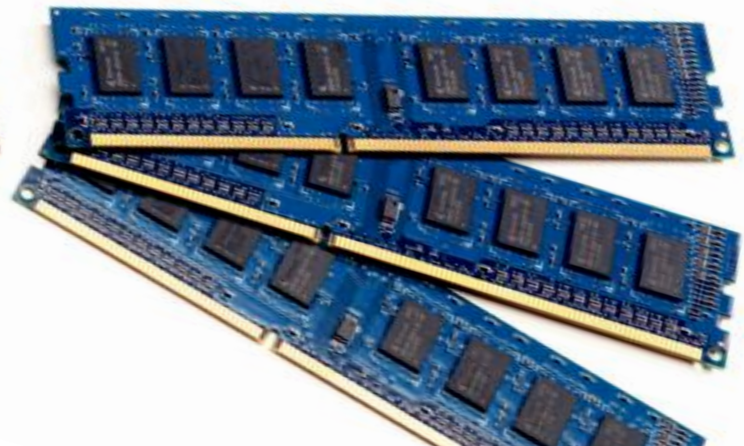
For our test, we settled on Intel's big, bad Core i7. Why? Our previous tests proved it's pretty much a wash between DDR2 and DDR3 on the Phenom II platform. Furthermore, Intel's Core i7 features a triple-channel DDR3 controller, and its ballistic speeds seem best suited for our bandwidth test. We used an MSI X58 Eclipse SLI board with a 3.2GHz Core i7, an EVGA GeForce GTX 280, an Intel X25-M SSD, and Windows Vista Home Premium in 64-bit trim. For RAM, we used 6GB of Corsair Dominator DDR3/1600 modules and 6GB of Qimonda DDR3/1066 RAM. Both were in tri-channel mode. For benchmarks, we selected a variety of synthetic memory, gaming, and application tests.

THE RESULTS

Coming into this from the uneventful Phenom II DDR2/DDR3 testing, our expectations were low. That's not because there's anything wrong with having extra bandwidth, but we've rarely seen it have much of an impact. Our experience has shown us that few applications actually require the added bandwidth that's available today.

We believed that to be doubly so with Intel's Core i7 series. The chip has so much excess memory bandwidth that anything more than DDR3/1066 seemed like overkill. With three DDR3/1066 modules in tri-channel mode, the chip has more than 25GB/s in memory bandwidth available. With three DDR3/1600 modules, it has in excess of 38GB/s available. The typical dual-channel DDR2 system today has about 13GB/s of memory bandwidth. While we could imagine the step up to DDR3/1066 having an impact with a Core i7, we were skeptical of the chip needing more than that.

We were wrong. At least partially. We were pleasantly surprised to see the Core i7 kick up some benchmarks by a noticeable amount with the DDR/1600.



Paying for higher-bandwidth RAM will get you more performance, but not in every application.

BENCHMARKS

	6GB DDR3/1066	6GB DDR3/1600
3DMark Vantage Overall	14,912	14,883
3DMark Vantage GPU	12,153	12,141
3DMark Vantage CPU	46,765	46,125
PCMark Vantage x64	10,209	**11,097**
Valve Particle Test (fps)	161	165
Quake 4 (fps)	224.6	**239.2**
ProShow Producer (min:sec)	9:51	9:34
MainConcept Reference Pro (min:sec)	10:24	**9:52**
Everest Ultimate MEM Read (MB/s)	12,544	**17,277**
Everest Ultimate MEM Write (MB/s)	9,740	**13,974**
Everest Ultimate MEM Copy (MB/s)	14,159	**19,151**
Everest Ultimate MEM Latency (ns)	41.2	**32.6**
SiSoft Sandra RAM (GB/s)	18.83	**27**
SiSoft Sandra Latency (ns)	75	**61**

Best scores are bolded.

The extra bandwidth didn't help everywhere, of course. It made no difference in Adobe Photoshop CS2 or Premiere Pro CS3. Likewise, 3DMark Vantage saw no difference going from 1066 to 1600.

But in PC Mark Vantage in 64-bit mode, we saw a rather healthy 9 percent boost going to DDR3/1600. Quake 4 (which we've long used as a bandwidth gauge) also showed a 7 percent improvement. Minor bumps also came in our ProShow Producer and MainConcept Reference encoding tests. The improvements weren't huge, but they were unexpected, since the tests have historically been purely compute bound. Photodex, the maker of ProShow, has long told us that its hand-written encoder loves faster CPU-to-CPU interconnects, and it apparently gets a small increase in performance from RAM bandwidth too.

More predictably, the synthetic memory benchmarks saw sizable increases from the DDR3/1600. SiSoft Sandra showed a whopping 44 percent increase, while Everest Ultimate showed similar gains of 35 percent to 45 percent.

The upshot of this: Unlike the Phenom II, giving the Core i7 more bandwidth will be worth it for folks who want the absolute tops in performance. Expectations must be tempered, however, because a great majority of applications will likely see very little difference. So if you're on a budget, saving cash by going with DDR3/1066 or DDR3/1333 isn't going to kill you. That's assuming you're running tri-channel though. Our initial tests with Core i7 showed that there are severe performance penalties for running RAM in single-channel mode. Dual-channel is better, but tri-channel will give you the best performance possible on a Core i7 system.

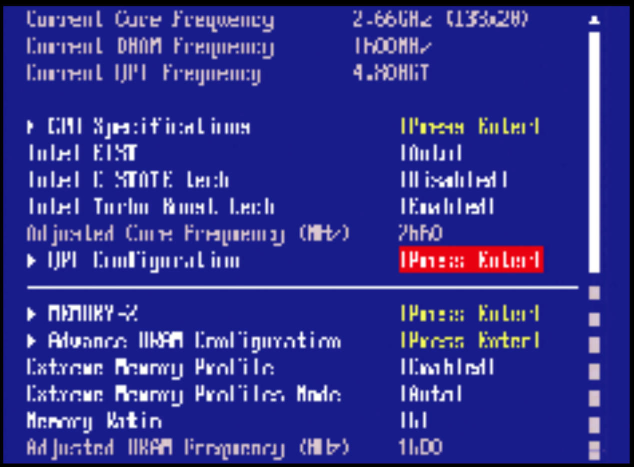
CORRECTION

Core i7 Memory: Locked or Not?

If you read our Core i7 overclocking guide in the April issue, you know we reported that Intel locked the memory multipliers on its non-Extreme CPUs. We said Core i7-920 and Core i7-940 were simply incapable of running DDR3/1600 at its rated speed without overclocking the bclock. Well, we were wrong.

Most of our Core i7 testing was based on engineering samples of the CPUs. These chips are supplied to hardware vendors and the media to perform tests before the chips go into full production. Normally, the difference is nil between ES parts and production parts, but Intel made a change that unlocked the memory multiplier (and QPI speeds too). The company said it made the change at the last minute in response to "customer requests." The change was so last minute that PC OEMs and even some Intel field engineers were unaware of it.

This is, of course, good news for folks interested in running higher-speed memory without having to resort to an overclock. Production Core i7-920 and Core i7-940 chips are fully capable of running DDR3/1333, DDR3/1600, or higher-rated RAM, and not locked down at DDR3/1066. This also makes the budget chips just a heartbeat away from the top-end Core i7-965 in capabilities. With the ability to increase the QPI from 4.8GT/s to 6.4GT/s and run the RAM at any speed you want, the only real difference between Extreme and non-Extreme today is the overall multiplier lock of the CPU, fine-grain Turbo Mode settings, and some thermal override settings. This makes the budget chips far more attractive than they seemed just three months ago.



This should make cheapskates everywhere smile: Retail Core i7-920s feature unlocked memory multipliers.

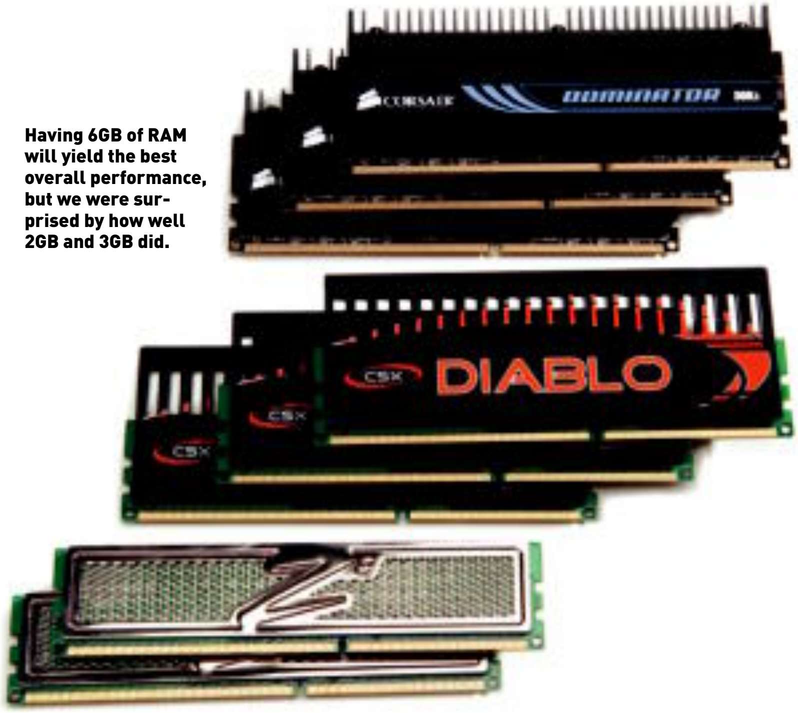
2GB vs. 3GB vs. 6GB

Less may not be more, but is it just enough?

You can never have enough money, ammo, or RAM. But is that really true? To find out, we looked at three very common memory configurations a person would face when building a new Core i7 machine. The first config is the upgrader. This person adopted DDR3 in the Core 2 days, and after paying $500 for 2GB of DDR3/1333 RAM, he sure as hell is going to migrate it to his Core i7 box, even if it means running the RAM in dual-channel.

The second configuration is the person who wants to scrimp a bit on RAM to perhaps buy a larger hard drive, so he buys 3GB of DDR3/1333. The third configuration is the geek who, sick of never getting more than 3.25GB of RAM in Windows XP, wants to break that 32-bit barrier. So he outfits his new Windows Vista Home Premium 64-bit machine with 6GB of DDR3/1333 RAM—and he damn well better see it say 6GB of RAM in the device manager!

Who has the optimum setup in terms of memory? Let's find out.



Having 6GB of RAM will yield the best overall performance, but we were surprised by how well 2GB and 3GB did.

THE TEST

For our test, we again reached for our MSI X58 Eclipse SLI board and first outfitted it with two 1GB sticks of OCZ DDR3 RAM to simulate our Core 2 Quad upgrader. The second configuration used three 1GB sticks of CSX Diablo DDR3 RAM. The third configuration used three 2GB sticks of Corsair Dominator DDR3 RAM. The Diablo RAM is rated for DDR3/2000 (although we could never boot our board at that speed with it), and the Corsair RAM is rated for 1600. We ran all three scenarios at DDR3/1333 speeds.

Again, we outfitted our X58 Eclipse SLI board with a 3.2GHz Core i7 Extreme Edition, an EVGA GeForce GTX 280 GPU, an Intel X25-M SSD, and Windows Vista Home Premium in 64-bit mode. We reached for the same combination of synthetic memory benchmarks, application, and gaming tests that we used in our other two challenges. Because we suspected that our standard benchmarks would not be enough to stress the amount of main memory, we also ran additional tests that would simulate a heavily loaded multitasking machine. The first was to launch Premiere Pro CS3 and open an HDV editing project. We then launched Photoshop CS3 and opened a 600MB PSD file. We also ran our Valve Particle Gaming test, which simulates multicore particle workloads. And we created an uber-workload by launching Premiere Pro CS3 and opening 30 images in Photoshop CS3, then running either Crysis or PCMark Vantage in 64-bit mode.

THE RESULTS

We saw fairly minimal differences between the dual-channel 2GB configuration and our 3GB and 6GB configuration in 3DMark Vantage and PCMark Vantage. Likewise, Valve's Particle Test, Quake 4, and ProShow Producer performed the same regardless of memory amount. Everest Ultimate also showed very little difference among the three configurations, which was a bit surprising, since we've seen a difference between dual-channel and tri-channel in this benchmark in the past. SiSoft Sandra's results, however, saw the tri-channel configs showing additional bandwidth. Again, we didn't expect much of a difference with our standard tests, which ran fine with 2GB of RAM in dual-channel mode. We did, however, see pretty good gains in our Photoshop CS3 test and Premiere Pro CS3 tests. Both handily favored the 6GB configuration over the 2GB and 3GB builds. We also saw minor improvements in ProShow Producer and MainConcept Reference.

OK, so what about our tests designed to specifically stress big memory holes? That's where we were first thrown for a loop. With Premiere Pro CS3 and Photoshop eating up a chunk of RAM, running our Valve Particle Test showed absolutely no difference. Why? We believe that all three apps were still below the 2GB threshold. That's where we expected Crysis to make a big difference. With Premiere running and 30 large images open in Photoshop, surely we'd see a frame rate

drop in this monster of a game, right? Nope.

Crysis is said to need 4GB of RAM to run smoothly, but the benchmark spit out the same frame rate with 2GB, 3GB, and 6GB installed. What gives? We suspect this is the result of one of the things Microsoft did right with Vista. The OS is far more efficient at memory management, and it likely just pushes aside applications to make room as needed. Performance was likely ameliorated by our use of Intel's superfast X25-M SSD. This drive's 200MB/s-plus read speed and zero access time is quite capable of masking disk caching that would be more apparent with a slower drive. We have to note that although the benchmark frame rates are fine, actual gameplay would probably suffer with these apps open—level loads would be slower, given that the OS simply has less RAM to play with.

PC Mark Vantage combined with Premiere and Photoshop actually gave us the results that we expected and in our opinion is a more reliable predictor of heavy memory loads. Unlike a gaming benchmark that's fairly small and runs for only a few seconds, this application simulates application performance and tries to measure how well a system runs. For example, in one section, the app plays a sample of HD footage and measures the frame rate. We could visibly see PC Mark Vantage struggle at times to complete runs with the other application open, and even the video playback would stutter with the 2GB and 3GB configurations. It was only at 6GB that we saw acceptable performance with PC Mark Vantage.

Our take-away: You can actually get by with less amounts of RAM if you are a single-tasking kind of person. Even the 2GB, dual-channel combos yielded acceptable performance. We don't recommend it though. The minimum a Vista 64-bit PC should run is 3GB and the recommended is 6GB. We say this because today's CPUs are designed to have multitasking workloads thrown at them. With so many available threads, you're expected to run multiple applications without significant performance slowdowns. By not having enough RAM, you hurt the machine's multitasking capability and you won't work as efficiently.

BENCHMARKS

	DDR3/1333	DDR3/1333	DDR3/1333
Capacity	2GB	3GB	6GB
Channels	Dual	Tri	Tri
3DMark Vantage Overall	14,919	14,859	15,001
3DMark Vantage GPU	12,189	12,149	12,216
3DMark Vantage CPU	45,456	44,901	47,467
PCMark Vantage x64	10,685	10,637	10,576
Valve Particle Test (fps)	157	155	159
Quake 4 (fps)	235	234	223.1
ProShow Producer (min:sec)	9:43	10:06	9:22
MainConcept Reference Pro (min:sec)	10:32	10:51	**10:02**
Photoshop CS3 (min:sec)	2:29	2:36	**1:56**
Premiere Pro CS3 (min:sec)	12:11	12:05	**10:04**
Everest Ultimate MEM Read (MB/s)	**14,378**	13,156	**14,023**
Everest Ultimate MEM Write (MB/s)	11,971	11,972	12,045
Everest Ultimate MEM Copy (MB/s)	15,310	15,922	**16,471**
Everest Ultimate MEM Latency (ns)	30.2	33.1	**38.2**
SiSoft Sandra RAM (GB/s)	16.19	21.0	**22.7**
SiSoft Sandra Latency (ns)	66	74	71
Premiere Pro + Photoshop with 600MB image while running Valve Particle test	155	157	158
Premiere Pro + Photoshop with 30 images while running Crysis at high resolution	66	67	64
Premiere Pro + Photoshop with 30 images while running PCMark Vantage	7,995	9,709	**10,490**

Best scores are bolded.

TO THE MAX

So You Want to Run the Most Memory Possible?

One of the most common questions we get is, why the hell doesn't Windows XP show 4GB of RAM? The short answer is, 32-bit Windows XP can address only 4GB of RAM. Since address space is also set aside for the graphics card memory and other devices in the system, the majority of 4GB systems end up with 3GB to 3.5GB of RAM available to the OS.

Although you might think that 32-bit Windows Vista overcomes this, it doesn't. Microsoft just changed the OS to report the total amount of RAM installed—part of that RAM is still being set aside for addressing memory used by videocards and other devices. The only way to fully utilize your 4GB, 6GB, or 12GB of RAM is to run with a 64-bit OS such as Windows Vista 64-bit, which inherently offers additional space for addressing memory other than RAM.

But that's not all. We've found that the still-immature X58 boards and BIOSes aren't the best at booting 12GB of RAM and seem to get confused on how to configure the memory. Before you fill all DIMM slots, install just three, do your build, and update the system to the latest BIOS. For example, we had to swap 6GB of Patriot RAM for 6GB of Kingston to go with our 6GB of Corsair RAM before we could POST our MSI board. Another trick you might try: Add a tiny bit of voltage. How do you do this if the system won't POST? Fire it up with just three sticks of RAM and change your BIOS settings. Then power down, unplug, discharge, and install your three other DIMMs and reboot.

Finally, we recommend that if you truly intend to fill every dang DIMM slot on that new Core i7 board, that you go specifically with RAM from the QVL, or Qualified Vendor List, that each motherboard maker publishes on its website. This will increase your chances of having a flawless build.

Out in the OPEN OFFICE

LIBERATE YOURSELF FROM MICROSOFT'S OFFICE SUITE! OPENOFFICE.ORG OFFERS WORD PROCESSING, SPREADSHEETS, DATABASES, PRESENTATIONS, AND MUCH MORE—FOR FREE!

What we know today as OpenOffice.org started life as a commercial office suite called StarOffice. But that changed after Sun Microsystems purchased the software's maker (StarDivision) in 1999 and subsequently released the source code for the entire office suite for free. This meant that anyone could grab a copy, and programmers could make and share their own changes to the code. After eight years of development, OpenOffice.org is now a stable and comprehensive suite of office applications that can genuinely replace more costly alternatives.

From the word processor, with its many formatting and layout options, to the comprehensive spreadsheet and powerful database, OpenOffice.org has got it all. Crucially, it's nearly 100 percent compatible with Microsoft's file formats. This means you can send files to people using Microsoft Word and they'll be able to read, print, and edit your documents, and vice versa. OpenOffice.org is also at the forefront of a new open standard called the OpenDocument Format (ODF), which just happens to be the default file format for OpenOffice. ODF is transforming the world of document sharing, and it guarantees compliance through a set of open standards. This means that documents you create and save using ODF can always be opened. They'll always work, which is more than can be said for many of its competitors.

Intrigued? Then follow along as we tour some of the goodies OpenOffice.org has to offer.

PHOTOGRAPHY BY MARK MADEO

Create Docs with Writer

Writer is a powerful word processor that can handle any writing job you throw at it

You'll feel right at home with Writer. It uses the same user interface that most word processors have adopted for nearly a decade. When you're ready to move on to more complex layout and formatting options, choose the corresponding icon or menu item. The Style drop-down menu, for example, is located under the New/Load/Save icons on the toolbar. It lets you turn highlighted areas of text into headings of different sizes, indented sections that move inward from the margin, or even lists, to give your document a professional look.

If you'd rather make manual changes to your text, then the drop-down font menu lets you change the font style, while the Bold, Italics, and Underline buttons will change the way the font is rendered.

ADDING FLAIR

Images can be dragged and dropped into the document, or imported through the Insert > Picture menu. Once you have the image within the document, you can drag it through the text to a different position, resize and rotate it, and change the way the text flows around it. Double-click the image to open the Picture options box, click the Wrap page, and select Through to stop the text reformatting around the image, for example. Color is also a useful way of making your documents stand out, with the highlighting icon being particularly handy. Use this tool just as you would a marker pen to highlight regions of text.

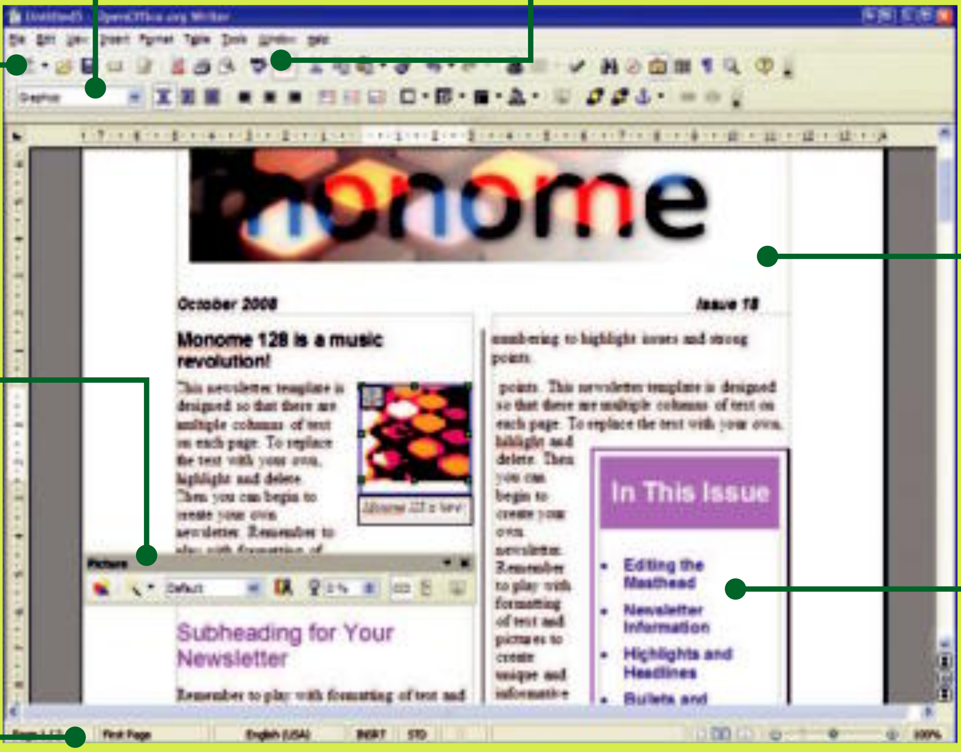
ADVANCED FEATURES

Writer is a comprehensive word processor that includes all kinds of advanced functionality. If you're writing a thesis, for example, the program can manage all your references and create a bibliography for you when the paper is complete. Just add the books you're referencing to the bibliography database (in the Tools menu), and when you make your reference in the text, choose Insert > Indexes and Tables > Bibliography Entry from the menu. Select your book from the drop-down list and click Insert. A link will appear in your document, and the entry will be added to your document's bibliography. It's a similar process if you want to create a table of contents or an index for your document. In the text of your document, make sure that each section has a title, and mark it using a heading from the Style menu. Heading 1 for the first tier of titles, for instance, and Heading 2 for the second. Next, open the "Indexes and

TOOLBAR
These icons duplicate functions hidden in Writer's menus.

FORMATTING
A drop-down list helps you choose how to mark specific regions of text.

SPELL-CHECKING
By default, auto-spell-checking is enabled, highlighting words with errors in them as they occur.



SECTIONS
Sections are blocks of text independent of other sections, which means you can have two columns in one section, and none in another, for instance.

FLOATING PALETTE
This toolbar allows you to change something about a graphical object; it can be dragged into the border of the window.

STATUS BAR
This discrete horizontal strip hides lots of features. Double-click the page list to open a document navigator.

BULLETS
Bullets are easy to add manually. Just add each item to a separate line, highlight them all, and click the Bullets icon in the toolbar.

Tables" window from the icon in Writer's Insert > Indexes and Tables menu and you'll see a preview of each heading as it will appear on the contents page. Just click OK and the table of contents will be slotted into the beginning of the document. Each heading you created will be listed alongside the page number it can be found on. If you continue working on the document and the page numbers change, right-click the table of contents and select Update Index/Table to recalculate the page numbers.

ACROBATIC TRICKS

Writer has more tricks, too. For example, you can generate Adobe Acrobat PDF files with a single click of the icon in the toolbar. The quality of the PDF output is excellent, and it can easily be shared with anyone capable of reading a PDF file. This feature alone transforms writer into one of the cheapest, fully functional PDF publishing tools you can find, and the next version of OpenOffice.org promises PDF editing ability.

CREATE WEB PAGES

There isn't all that much to creating a web page in Writer; you just select HTML Document as the file type when you save your document. This will generate an HTML file that can be either loaded into a web browser or uploaded to a web server. However, there are some important caveats. The most significant is that generated pages will look nothing like the original document. HTML doesn't have all the same formatting and layout options as a Writer document, but there are a few things you can do to mitigate this effect. First, make sure you use Writer's predefined styles as much as possible. This is because styles are directly translated into HTML text. Second, tables will also be accurately re-created on a web page, so don't be afraid of using them. You can insert text and images into a table cell. Writer also makes it easy to add hyperlinks to your web page, linking to other parts of the same document or other pages on the Internet. Select the word you want to use as a link to a remote page, then click Insert > Hyperlink. This will open a small configuration window, where you can enter the target URL. Or, the button to the right of the Target address will transfer a URL from your default web browser to prevent typing in any mistakes. When you've finished with the panel, click Apply and you should find that the word you originally highlighted is now a link to the web address you entered.

HOT TIP!

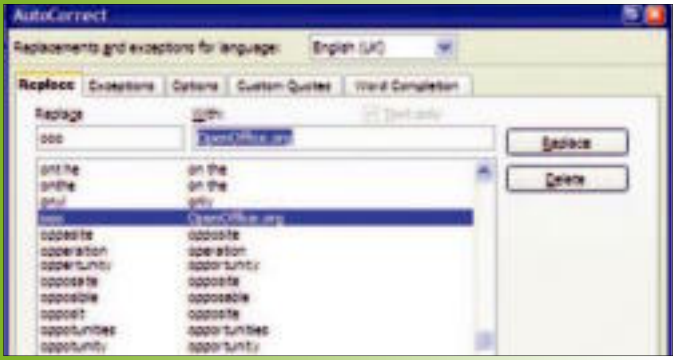
TEMPLATES
If you tend to re-create the same old document framework, try setting up a template. Create a version of the document without any specific details, and save it in ODF Text Document format.

STEP BY STEP

Spotlight on Writer's Tricks

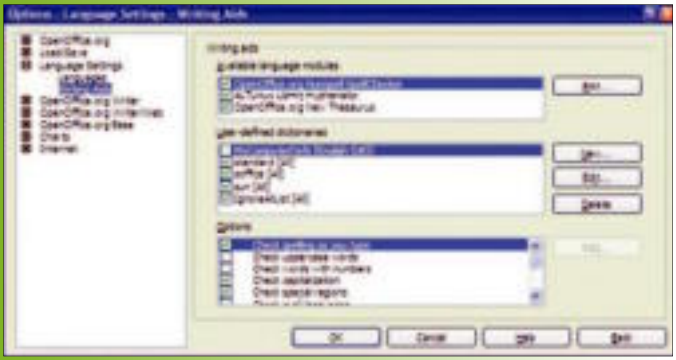
1 THE AUTOCORRECT UTILITY

This feature will replace common symbols and abbreviations with the longer equivalent. Go to Tools → AutoCorrect. The first page lets you create new replacements and exceptions, and run advanced options.



2 SET UP A CUSTOM DICTIONARY

You might find yourself adding many of your own words from the right-click mouse menu. Custom dictionaries can be managed by opening the Writing Aids window (Tools → Options) and switching to Language Options.



3 SAVE TIME AND EFFORT WITH AUTOTEXT

Insert predefined sections of a document by typing a key sequence and pressing F3. Configure which snippets of documents are triggered by which keys by opening the AutoText window from the Edit menu.

Crunch Data in Calc

You don't need to be a mathamatical whiz kid to show off some simple spreadsheet skills

Calc's main user interface can be a little intimidating for beginners, so it's best to think of the program as a word processor for numbers. Normally, groups of numbers that have a common factor are arranged in columns. Calc will try to guess the type of data you're entering. If you were entering birthdays, for example, you could type either 05/16/72 or May 16, 1972, and Calc would convert the data to the same format. Most people use the top row and first column for labels. So, we labeled the top of our birthday dates column "Date," and "Name" for the column that contains the names of the people whose birthdays we're listing.

THE FUNCTION OF FUNCTIONS

Functions are used to generate new data in the spreadsheet from data it already contains. At its simplest, a new column of data could be created from the sum of two other columns, for instance. The function part is the keyword Calc uses to work out what to do with the value ranges you enter, e.g., SUM to denote summation. Thus, using the function =SUM(A2:B2) in the main text adds the values in column A and B together. However, you can also use SUM for functions other than addition. Typing =SUM(A2-B2), for example, will subtract the value held in cell B2 from the value held in A2, and you can do the same with multiplication and division using "*" and "/," respectively.

Selecting Function List from the Insert menu opens a panel that lists all the functions that Calc understands. A drop-down list enables you to fine-tune the functions you see to a more relevant selection, and when you roll your mouse over the function name, you get a description of what each one does. In the mathematical list, you'll find SUM, for example. If you need a little more help, the function wizard hides behind the "f" icon on the toolbar. This wizard helps you construct functions by working out how many parameters are needed by each function, then providing an input field for each. As you modify your function, the result is updated, making it easy to see if you're getting the output you were expecting.

FINANCIAL HELP

It's only after you get all the numbers into a spreadsheet that things get interesting. You could create a graph with a column of data or set up another column by combining the data from two others. Personal finances are a good example. Import transaction details from your online bank, either by using copy and paste or by loading a CSV file. Each transaction will occupy a new line. The columns will represent the same information for each transaction, such as the date and amount you spent (or earned). On a new column, add a category for each transaction type, grouping similar items under the same category.

Now that your data is laid out in front of you, you can look at your spending habits from a variety of angles. You could create a quick pie chart, for instance, immediately showing where your greatest expenditure lies. Alternatively, you could average out your spending over a period of time and see how your balance fluctuates over the course of a week, a month, or a year. It's only when you have a table of data sitting in front of you that you can fully realize the possibilities.

HOT TIP!

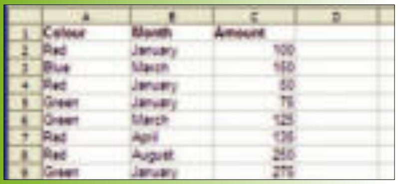
SPLIT THE VIEW
While working with large tables, it's sometimes convenient to split the view so that you can see two sections of a table at the same time.

STEP BY STEP

Make Your Data Look Attractive

1 ORGANIZE YOUR COLUMNS

Enter data by double-clicking a cell and typing the information. Graphs work on selected ranges of data. This means that the data in your spreadsheet needs to be well organized, with each column restricted to a single data type.



2 MAKE USE OF AUTOFORMAT

You can manually select cells, rows, or columns and use the formatting options in the toolbar to make sections of your spreadsheet more visually distinct. Alternatively, select your cells and click Format → AutoFormat.

3 GENERATE A GRAPH

To create a graph, select the column or columns of data you want to show and click Insert → Chart. This will open the Chart Wizard, and you'll see a quick preview of the chart pasted into your spreadsheet.

Create a Great Slide Show

Impress is capable of far more than showing facts and figures

Impress is designed to make creating slide shows of information as easy and as striking as possible. To use the program effectively, there are just a few concepts to master. The main component for any project is the Master Slide. It defines how your presentation is going to look, from the image borders and text layout to the colors used in the background. OpenOffice.org includes a choice of several templates when you first launch the new project wizard. However, creating your own layouts from scratch isn't that hard. The second page of the Presentation Wizard lets you choose between any preinstalled master documents, defining the overall look and feel of your presentation, as well as how you're going to output your work. The final page deals with the animated transition between each slide.

LAYOUTS

The Layouts palette lists all the most common varieties of slide formats, and choosing one imposes that format on the current slide. You can switch between layouts to see which work best. The same is true of Master Pages. These provide an overall look and feel to your presentation, because they contain things like a background image and the color palette used for all the main elements on the page. Make any changes to the Master Page for your presentation, and the alteration will filter through all the slides with the same master automatically.

STEP BY STEP

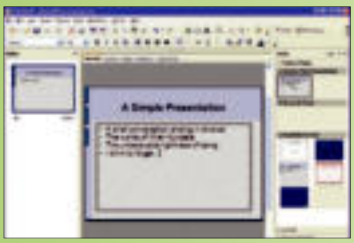
Assemble a Basic Presentation

1 FOLLOW THE STARTUP WIZARD

This wizard helps you create a basic setup. Choose "From template" as the Type. Click Next. Keep the background and output as "Original" and click Next again. You can then configure the transition effect.

2 ACCESS THE OVERVIEW PAGE

Add your name and the subject of the presentation and click Create. You'll be dropped into the main Impress screen. When you've typed enough words, try changing their appearance by applying the example Master Pages.



ON THE CHEAP

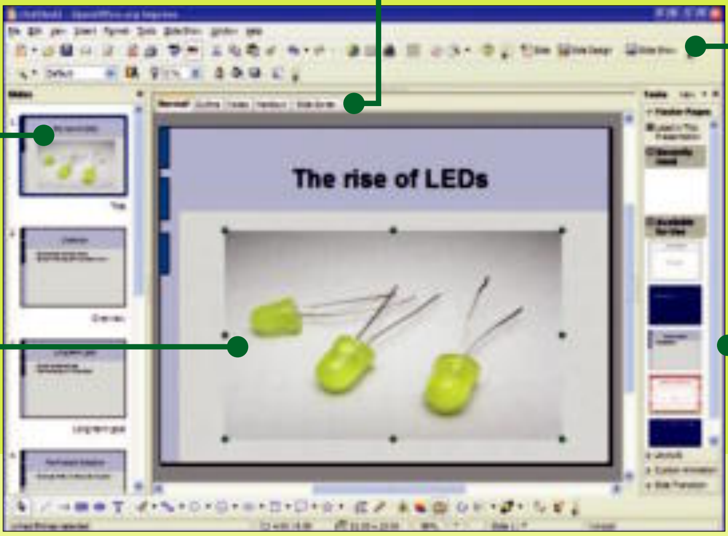
Other Budget Alternatives

You might be surprised to learn that StarOffice, the office suite that evolved into OpenOffice.org, still exists today as a separate entity, although the differences between OpenOffice and StarOffice are slight. The products are based on the same code, employ virtually the same user interface, and offer the same features. The main difference is that StarOffice is aimed at enterprise customers, and as such, it includes a host of useful extensions as part of the primary installation—with OpenOffice, you need to download these extras separately—and a greater degree of technical support from Sun, including corporate migration from Microsoft Office to StarOffice. And unlike OpenOffice, StarOffice is not free. Still, at $35 a pop, you're looking at a big savings from the $500 (or $330 upgrade) Microsoft is asking for its enterprise offering, Office Professional 2007.

If, however, you're a Microsoft diehard, you can save considerably on the Office suite if you purchase the Home and Student edition, which costs $150 and excludes Outlook along with a few other enterprise-oriented apps.

Budget solutions also exist online—or in the cloud, as they say. Both Google Docs and Zoho are free productivity suites, with applications for word processing, spreadsheets, presentations, and other uses. And because both are Internet-based, they have the advantage of being available for collaboration and retrieval by others whom you grant access to.

PROJECT LAYERS
These tabs hide extra functionality for the presentation. The Outline pages display only the text. The Notes page is for text that won't be in the presentation. Handout arranges four slides to a page for printing, and the Slide Sorter enables you to drag and drop the order of the slides.



PREVIEW
This panel shows a thumbnail view of each slide in your presentation. You can drag the title label to pull the panel out of the main interface, and drag the right border to resize the thumbnails.

EDIT AREA
Like any other OpenOffice.org application, this is your main work area. Text and illustration boxes can be freely moved around and edited, and you can drag and drop images from Explorer. Right-click to enable grid alignment locking.

SLIDE SHOW
Click this button to run through your presentation. If you have your laptop configured for dual-screen display, you'll still be able to see the slide and notes on your laptop screen, while all your audience can see is the full-screen view of your slide show.

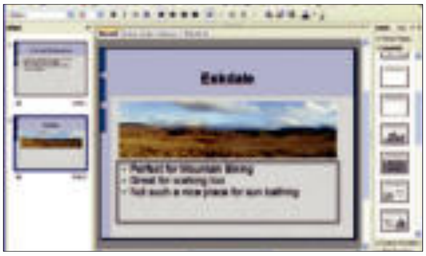
TASKS PANEL
Master pages change the appearance of a presentation. The Layout panel is used to alter the arrangement of text and illustrations on a single page. Slide Transition will animate the transition from one frame to another; design your own using Custom Animation.

3 ADD SLIDES

The left panel of Impress shows thumbnail views of each slide. Right-click in the white area below the first slide, and select New Slide. A new slide will appear containing some generic text. Select it and choose a suitable layout.

4 ALTER THE LAYOUT

Changing the layout will keep your text and illustrations intact, and only alter the way they're organized on the page. Press F5 or select Slide Show from the Slide Show menu to run the presentation sequence.



COMPATIBILITY

When Office Suites Collide

The biggest worry for most people considering OpenOffice.org is compatibility. Will you be able to load files that other people send you, and will they be able to open the files you send back? The answer to both of these questions is yes. You can open and save Microsoft file formats, such as the .doc format for word processing files, or .xls for spreadsheets, and you can select these formats when you save a file so that your Microsoft Office–using recipient won't have any trouble seeing your work. However, there are exceptions. These usually become apparent only when you use some of the more advanced features of an application, creating massive, feature-rich documents, for instance. With .doc files, for example, you may notice some very slight formatting differences between Microsoft Word and OpenOffice.org Writer. Spreadsheets are the biggest troublemaker, and that's thanks to macros. Macros are a way of telling the spreadsheet how to automate a process. It could be balancing the books at the end of the month, or grabbing names from a database to use within your own birthday card designs in a word processor. OpenOffice.org isn't completely compatible with macros. Most will work, but some won't. This is the only gray area, which means if you don't need Microsoft compatibility with these kinds of advanced functions, there's nothing stopping you from using OpenOffice.org. And if you do, then you just need to be a little wary when sharing your documents with Microsoft Office–owning colleagues.

WHITE PAPER

BitTorrent

How peer-to-peer file-sharing networks work —MICHAEL BROWN

BitTorrent is a tremendously popular peer-to-peer file-sharing protocol designed to simplify and speed up the process of transferring large files over the Internet while drastically limiting the bandwidth consumption of any one server.

In a conventional file-transfer process, a file is stored on a server on a network such as the Internet. Other computers on the network send messages to the server, informing it that they would like to copy that file. When the two sides establish a connection, the other computers become clients to the server. As the number of clients increases, so do the demands on the server. And while each client might consume only a little bandwidth, the server can consume tremendous amounts. To reduce costs and prevent the server from crashing, the server's owner will typically constrain the speed at which each client is allowed to download data or even limit the number of clients that can be served at one time.

NAPSTER AND GNUTELLA

Peer-to-peer file sharing eliminates the need for a central server to host files. The original Napster, however, still relied on a central server to keep track of connected computers and the files available on them. That's how the service ran afoul of copyright laws and was eventually forced to shut down: Napster's servers didn't store copyrighted material, but the courts decided that Napster's service violated the Digital Millennium Copyright Act because the company knowingly facilitated copyright infringement.

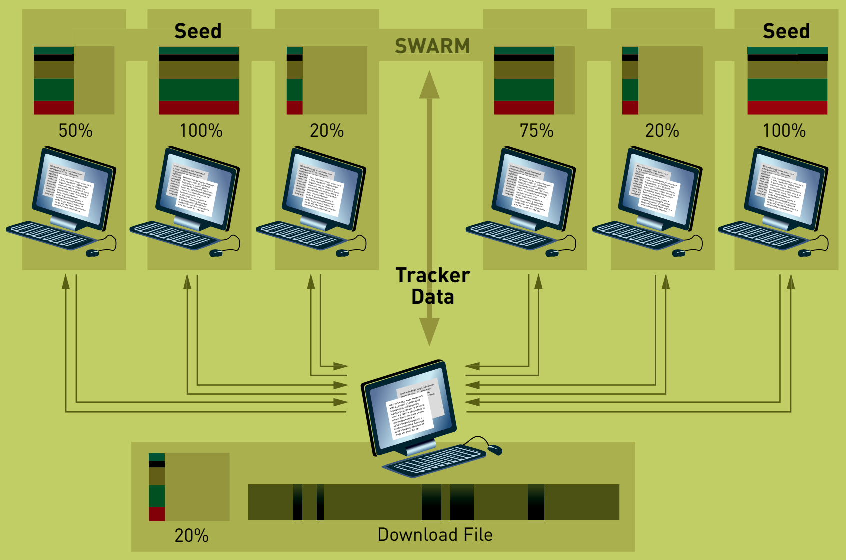
While the Napster lawsuit was underway, another peer-to-peer network named Gnutella sprang up and completely eliminated the centralized server. When you launch a Gnutella client, it immediately searches the Internet for other computers running Gnutella clients. Each of these peers is called a node. When you initiate a file search, the Gnutella client queries each node to determine if it's hosting the file you're looking for. If these nodes don't have the file you're searching for, they'll send queries to the nodes they're connected to. The node that does have the file will send a response message back to the node that initiated the search, and the user can then decide whether or not to download it.

WITH BITTORRENT, A FILE'S POPULARITY ACTUALLY INCREASES THE SPEED AT WHICH IT CAN BE DOWNLOADED.

Gnutella has two significant shortcomings: First, it relies on file transfers between just two peers. Since the most common means of consumer Internet access—cable and DSL—use asynchronous connections in which download speeds are much higher than upload speeds, the peer downloading the file is limited to whatever speed the peer uploading the file is capable of. Second, it depends on users to reciprocate, but it can't force anyone who downloads files from other people's computers to allow others to download files from their machines. Netiquette frowns on this practice, which is known as leeching, but Gnutella can't prevent it.

HOW IT WORKS

Trackerless BitTorrent



In the original BitTorrent, one computer acted as a tracker to coordinate the peer-to-peer file-transfer process. The tracker maintained a list of which computers on the Internet were in the process of uploading or downloading pieces of the seed file. A trackerless BitTorrent system eliminates this central computer by distributing the tracker data amongst the swarm participants.

BITTORRENT

BitTorrent cleverly avoids the legal and practical problems associated with peer-to-peer file-sharing networks like Gnutella and the original Napster. It allows one peer to rely on several others for file transfers, rendering the process both faster and cheaper for all the

peers involved, and it has a reward system that encourages user reciprocation.

Rather than establish a relationship between just two peers, the BitTorrent protocol simultaneously gathers pieces of a file from several peers that already have the file or that are in the process of obtaining it. It then downloads these pieces to your computer and reassembles them on your hard drive when all the pieces have been acquired.

The BitTorrent protocol depends on at least one peer making the entire file available to the network; this is known as the "initial seed." As other peers begin downloading this seed file, they simultaneously upload pieces of the file to other peers that are looking for it. Each peer is encouraged to continue making the file available after they've downloaded it in its entirety, in effect creating additional seeds. A BitTorrent client can facilitate this with a tit-for-tat scheme that rewards reciprocation by giving preference to peers that send data back.

To share a file, the user first creates a smaller file, called a "torrent," that contains metadata about the file and the "tracker" computer that will coordinate the file distribution. The metadata inside the torrent file varies according to the BitTorrent client that created it, but the file will have an "announce" section that specifies the tracker computer's URL, and an "info" section containing file names, file sizes, and a hash code for each piece of the file (more on this later).

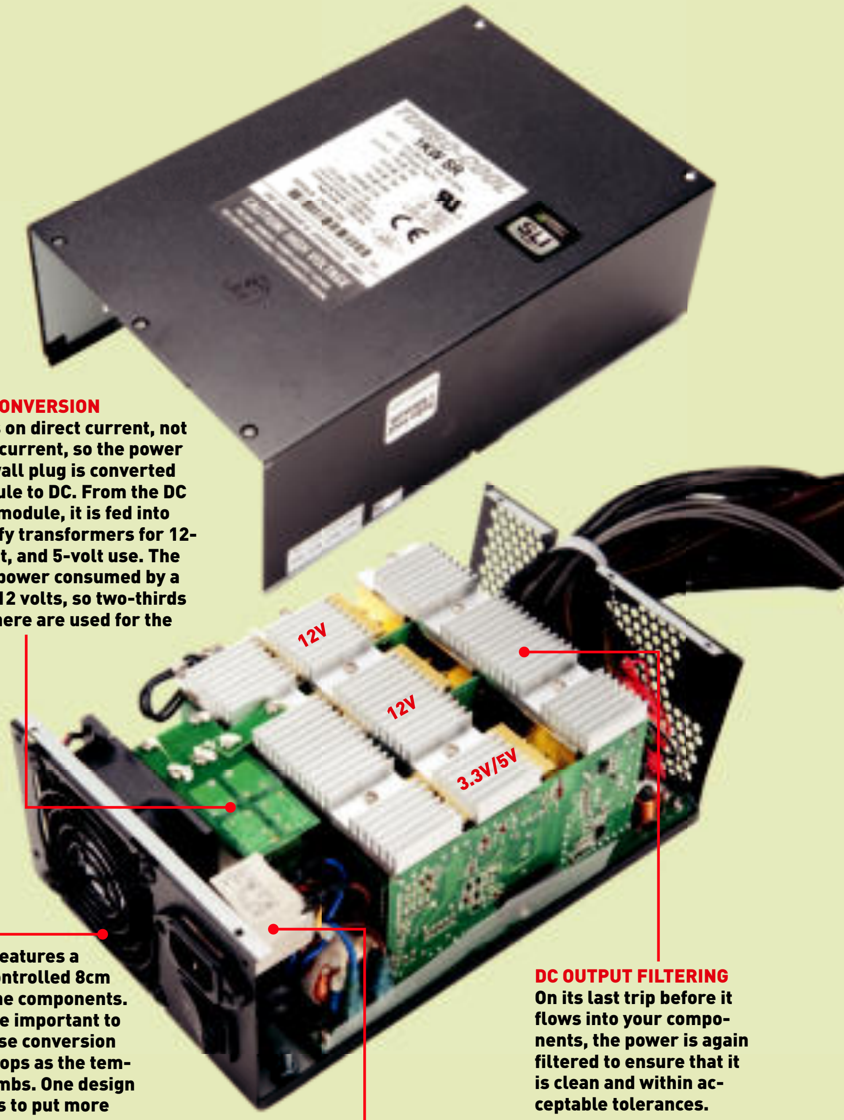
Any peer that wants to download the file must first download the torrent file associated with it. The torrent will connect the peer to the appropriate tracker, which will in turn tell the peer which other peers are currently downloading the file. All the peers actively engaged in sharing a particular file are referred to as a "swarm." The more peers in the swarm, the faster each peer will be able to download the file. In a conventional client-server relationship, a file in high demand can be slow to download because it presents a hardship for the servers hosting the file. With BitTorrent, a file's popularity actually increases the speed at which it can be downloaded.

Each peer distributing a file breaks it into chunks ranging from 64KB to 4MB in size and creates a checksum for each chunk using a hashing algorithm. When another peer receives these chunks, it matches its checksum to the checksum recorded in the torrent file to verify its integrity.

A "trackerless" BitTorrent system has no central computer coordinating the file sharing; instead, every peer acts as a tracker. In this case, the BitTorrent client employs a distributed hash table to keep track of the location of the initial seeds, checksums, and peers actively engaged in the swarm.

1,000 Watt Power Supply Unit

There's an easy trick to telling the difference between a quality power supply and a cheap one—the heavier it is, the higher the quality. But just where the hell does that weight come from, and how does it aid operation? To find out, we cracked open a PC Power and Cooling 1KW-SR, which is about as heavy as they come.



AC-TO-DC CONVERSION
The PC runs on direct current, not alternating current, so the power from your wall plug is converted by this module to DC. From the DC conversion module, it is fed into several beefy transformers for 12-volt, 3.3-volt, and 5-volt use. The majority of power consumed by a PC today is 12 volts, so two-thirds of the guts here are used for the 12-volt rail.

FAN
This model features a thermally controlled 8cm fan to cool the components. Thermals are important to a PSU because conversion efficiency drops as the temperature climbs. One design philosophy is to put more fans in to keep components cool. Another philosophy, which this unit embodies, is to rely on beefier, hardier internal components to get you through those hot summers, because a fan will get you only so far.

AC INPUT FILTERING
Initial alternating current is fed into an input filter that cleans up the common noise coming across most household wires and grids.

DC OUTPUT FILTERING
On its last trip before it flows into your components, the power is again filtered to ensure that it is clean and within acceptable tolerances.

SUBMIT YOUR IDEA Ever wonder what the inside of a power supply looks like? Don't take a chance on destroying your own rig; instead, let us do the dirty work. Tell us what we should crack open for a future autopsy by writing to comments@maximumpc.com.

HOW TO

Step-by-Step Guides to Improving Your PC

THIS MONTH

64 STREAM YOUR MUSIC LIBRARY TO ANY COMPUTER

66 MAKE THE ULTIMATE BOOT DISK

67 ENCRYPT YOUR HARD DRIVE WITH TRUECRYPT

DROPBOX FOR POWER USERS

NORMAN CHAN
ONLINE EDITOR

One of the things I've been championing on MaximumPC.com is Dropbox (**www.getdropbox.com**), an awesome data-storage service that keeps your documents hosted in the cloud. The premise is simple: A small app creates a local folder that will be synched across all computers with your Dropbox account, whether it's a Windows, Linux, or even OS X machine.

But in addition to keeping your files safe, Dropbox has some pretty handy alternative uses. For example, I've squared away part of my free account's 2GB of space to host portable apps (**http://portableapps.com**) that I can run from any Internet-enabled desktop, in case I forget my USB key. I also work off Word and Photoshop files directly from my Dropbox folder, which is a lifesaver during power outages. But the coolest use I know of is enabling a keylogger to automatically upload keystroke transcripts to your account, which may help you track down your laptop if it's ever lost or stolen. **–NC**

SUBMIT YOUR IDEA Have a great idea for a How To project? Tell us about it by writing to comments@maximumpc.com.

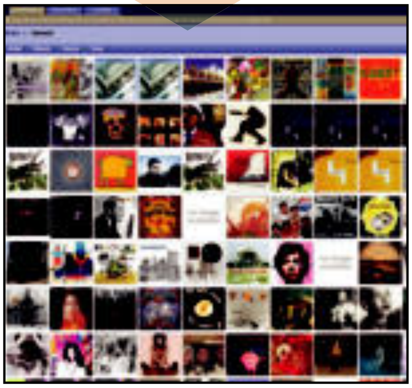
WINDOWS TIP OF THE MONTH

Leave No Trace

Paranoid PC users know that when you delete a file, it can still be retrieved with data-recovery software. Even the Shift+Delete command won't permanently wipe a document from your hard drive. The only way to really shred a file is to use a secure delete application, like SDelete (**http://tinyurl.com/28e5r3**), a free tool from Microsoft.

Stream Your Music Library to Any Computer

Sometimes you just want to browse and listen to your album collection at the office without having to load it all into a portable music player. Last.fm and Pandora are great web services that can help you discover new music, but they won't let you specify your own music playlist. Streaming music from within a home network is easy with iTunes and Windows Media Player; what's trickier is getting access to your 100GB music library while away from home. We'll teach you how to turn your library into an Internet radio station with Apache server software and a little-known program called netjukebox. You'll be able to browse your collection via a gallery of album cover art, stream custom playlists, and even download entire albums as zip files. –NORMAN CHAN



1 SET UP AN APACHE SERVER

The first thing you need to do is turn your desktop into an Apache web server. This will let you run the netjukebox software and serve web content. Installing Apache can be a complicated process, so we recommend using XAMPP (**www.apache-friends.org**), a web server package, to streamline the setup. This package includes Apache HTTP, MySQL, PHP, and even FTP server support. Download the latest version of XAMPP for Windows (1.7 as of this writing) and run the installer.

Choose the default install location (C:\xampp is recommended, especially for Vista) and choose your desired shortcut icons on the Install screen. You're also given an option to install Apache as a service, as opposed to an application, which allows it to start even before you're logged in to Windows.

After XAMPP finishes installing, launch its Control Panel. Click the Start button next to Apache and MySQL to enable the web server. The other options let you run a FileZilla FTP server and a Mercury email server, which we won't be using here. If Apache and MySQL are activated properly, you'll see their status as "Running," highlighted by a green bar. Minimize this Control Panel to the system tray.

2 INSTALL NETJUKEBOX

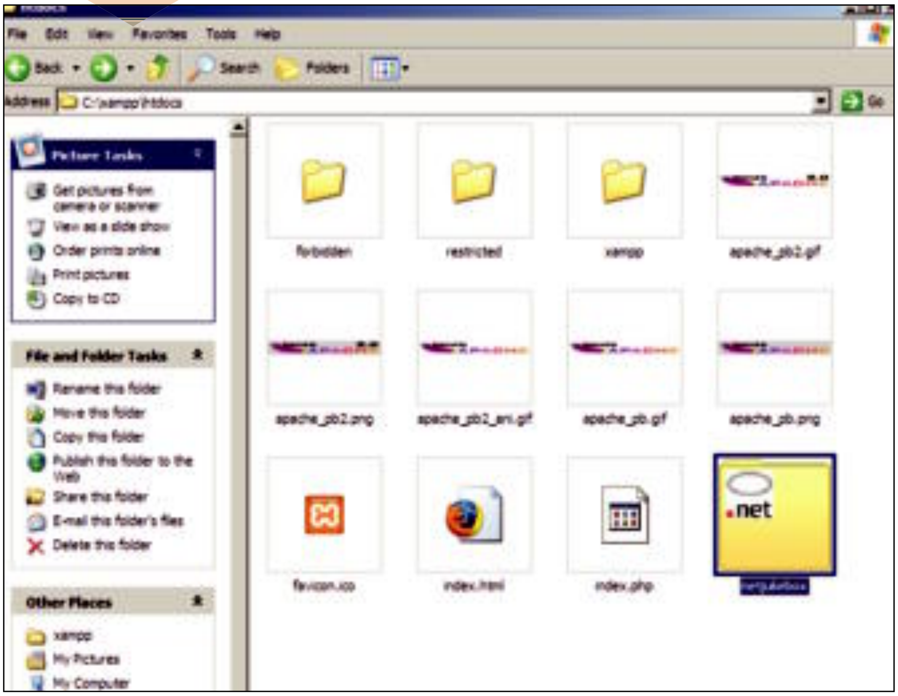
Download the netjukebox for PHP zip package (**www.netjukebox.nl/**)—the current version is 5.09b—as well as the codec pack. Navigate to the "htdocs" subfolder and extract the contents of the netjukebox zip file into a folder called "netjukebox."

Open a web browser and type "http://localhost/netjukebox/" into the address bar. If you extracted the files correctly, you should see a light-blue login page.

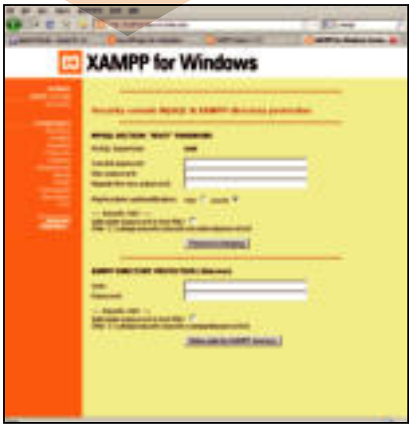
Create a new folder called "codecs" within the netjukebox folder, then unzip the 14 files in the previously downloaded codec zip file into this new folder (C:\xampp\htdocs\netjukebox\codecs).

3 CONFIGURE YOUR SECURITY

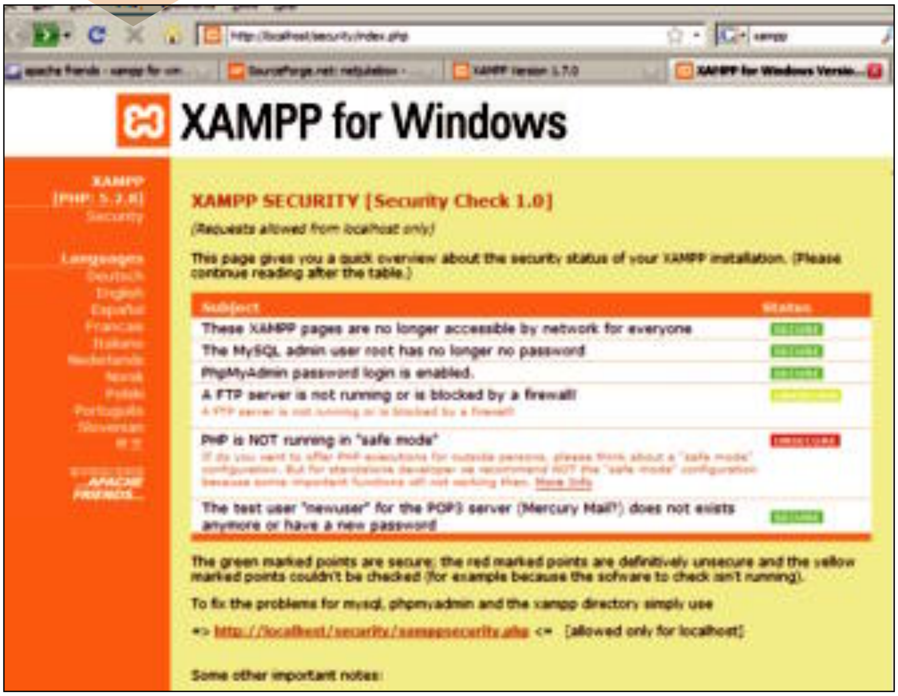
Access the XAMPP settings page by directing your web browser to http://localhost/xampp/. Click the Security link in the menu on the left side of the page. Right



now, the status of your XAMPP pages and MySQL admin user root should be Unsecure. Click the link in the middle of the page to set up your server passwords.



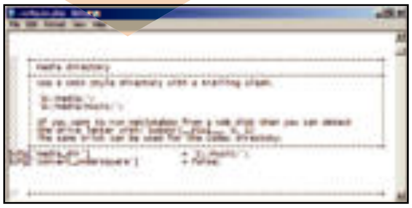
Choose a strong password in the required field under the MySQL section, confirm it, and select “cookie” as the PhpMyAdmin authentification setting. Leave the “Safe plain password in text filed” box unchecked. Enter and confirm a username and password for the XAMPP Directory Protection (.htaccess) section as well. Click Submit to save your changes. You should receive a confirmation that your XAMPP directory is now secure, and the security page will reflect the new security status.



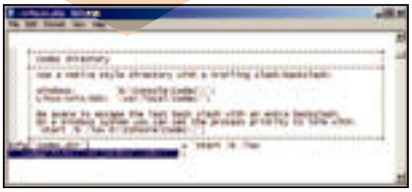
4 CONFIGURE NETJUKEBOX

Navigate to the “include” subfolder under netjukebox and open the config.inc.php file with Notepad (drag the file into the Notepad app). You’ll have to edit a few lines in this configuration file to direct netjukebox to your music library and set up an administrator password.

Search for the line that begins with $cfg[‘media_dir’]. You’ll see that the default location where netjukebox searches for your music collection is D:\Media. Replace that with the location of your music files. We directed netjukebox to C:/Music/. Note that you must use forward slashes and a trailing slash in this field.



Next, search for the line in this config file that begins with $cfg[‘codec_dir’]. This is where netjukebox looks for the audio codecs to play or transcode your MP3s. Replace the default entry with C:\xampp\htdocs\netjukebox\codecs\\. It’s important to note that we use backslashes in this field; plus, we end the line with an extra backslash.



Finally, find the section that starts with the MySQLi Configuration header in this same file. Under the line $cfg[‘mysqli_password’], replace the password field with the MySQL password you entered in the previous security step.

5 IMPORT YOUR MUSIC

Using your web browser, go to your netjukebox administrator page (http://localhost/netjukebox/users.php). Enter “admin” as both the default username and password. Click the admin username on the left and change the password. The admin account lets you create new user accounts, as well as restrict what users can do on your netjukebox.

Go back to the main netjukebox configuration panel by clicking the config tab at the top of the page. If this is your first time using netjukebox, click the Update link under the Configuration window. Netjukebox will scour your music library and index all your albums. This may take a while, depending on how many songs you have in your collection.

Netjukebox also has a really cool feature that automatically searches for album art for all of your CDs. In the Configuration menu, click the Update Image link, and the system will cycle through all of your albums, searching online databases for album covers based on folder names, and let you approve each piece of cover art.

To remotely stream or download your music, find your IP with a service like **www.whatismyip.com**. From any web browser, type in your IP and add the /netjukebox/ extension. If you’re not behind any firewalls or routers, you’ll get access to the netjukebox login page and be able to browse through all of your music files!

Read more about netjukebox and find instructions for port forwarding and DNS routing at ***http://tinyurl.com/cvqlau***.

Make the Ultimate Boot Disk

Looks like your system is on the fritz again—it's giving you boot errors. What do you do now? You can take it to a tech shop and have "experts" investigate the problem, but that's a costly option. Even if your computer won't load Windows, there is still a way to fix boot problems without reformatting. With the right boot CD, you can perform your own troubleshooting diagnosis to cure whatever ails your PC. This guide will show you how to make a powerful boot disk that'll let you do more than just access a DOS prompt. You'll be able to run processor stress tests and memory scans, edit partitions, and even extract hard drive data. –JOSH KAMPSCHMIDT

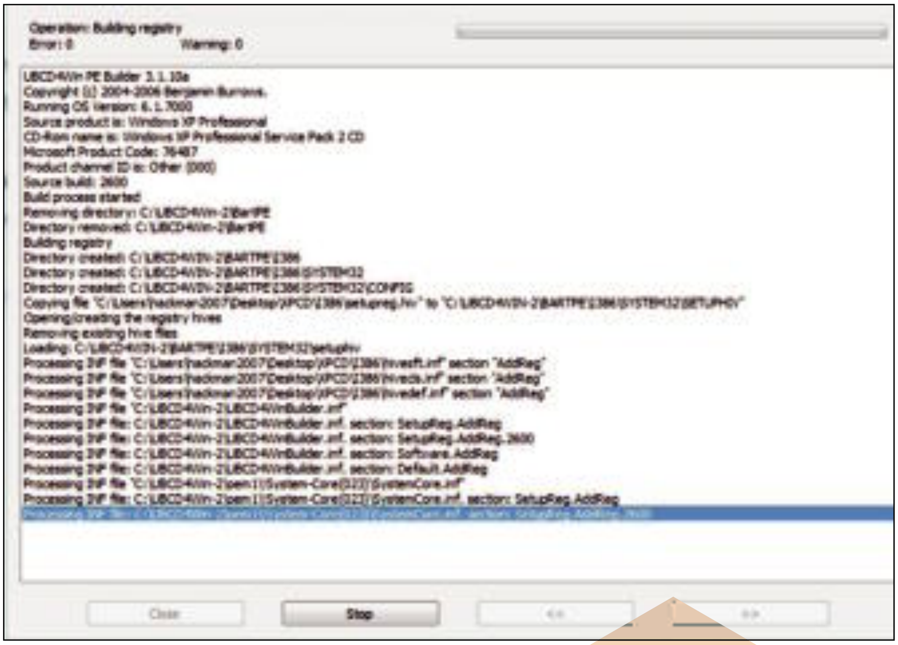
1 PREPARE THE CD FILES

First, download the project file for the Ultimate Boot CD for Windows (**www.ubcd4win.com/downloads.htm**). Since this disc uses Windows XP files to boot, the CD is not distributed as an ISO to avoid breaking Microsoft's Windows EULA. Instead, you must manually build the project files.

Put your Windows XP CD into your optical drive. Create a new folder on the desktop and name it "XPCD." Explore the CD (do not execute the autorun) and drag all the files from the CD into this new folder. This will create a copy of all the XP files that are on the CD. If you don't do this, your CD will be unable to boot and the build process will fail.

Double-click the downloaded UBCD4Win file. An installation wizard will pop up, letting you change the extraction location. Keep all the default settings to minimize the chance of problems. The program will extract the files to the C:\UBCD4Win directory.

After the program is done extracting, it will want you to do an MD5 Hash verification to make sure the file is not corrupt; click Yes to verify the file. If you receive any errors on the hash check, redownload the file, because a corrupted file could cause serious problems when trying to build the CD.

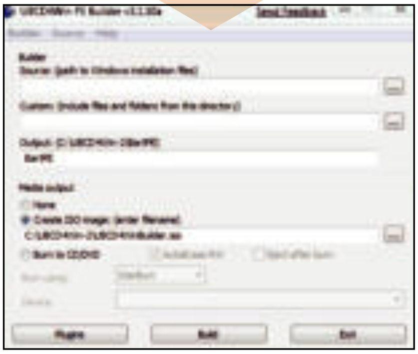


After the verification, UBCD4Win will start enumerating the files and folders to make sure there are no missing files. If it detects that there are files missing, you will have to redownload the file.

2 BUILD THE CD IMAGE

Once UBCD4Win completes the individual file integrity check, you can start compiling the CD. UBCD4Win will ask if you want to check for patch releases and minor updates. You aren't required to do this, but we recommend that you click Yes. Click Finish to begin the build process.

Do not let the installer automatically search for Windows installation files, because that will take a long time. The reason for creating a folder with all the XP installation files earlier was so we could skip this step.



Next, you'll be presented with the main PE Builder window, where you'll see a Source, Custom, Output, and Media Output section. We'll be using the Source, Output, and Media Output sections.

Click the Ellipses button to the right of the Source text box. Direct it to the XPCD folder you created earlier and click OK. In the Output section, leave the word "Bart PE" alone. Under Media Output, we recommend that you create an ISO image first, but you can also burn directly to a CD. We are going to assume that you are creating an ISO image.

PE Builder will store the ISO in C:\UBCD4Win and name it "UBCD4WinBuilder.iso." Don't change the name or location. Click the Build button, and PE Builder will start building the image.

3 BURN THE DISK

It may take a while to build the ISO. When the installer is done building, click the Close button, then hit Exit in the PE Builder window. Navigate to C:\UBCD4Win. Inside that folder, you will find UBCD4WinBuilder.iso. Burn this file on a blank CD using free software such as IMGBurn (**www.imgburn.com**).

To use this CD, just restart your computer and boot from the disc. You may have to change your boot order in the BIOS.

Read more about building the Ultimate Boot Disk at ***http://tinyurl.com/caehjk***.

Encrypt Your Hard Drive with TrueCrypt

Hard drive encryption sounds like an intimidating concept, mostly because it is. The thought of taking your precious files, then using a mathematical formula to convert them into random noise before scattering them back across your disk, is a hard sell.

The good news is you no longer need to be a member of the CIA to lock down your machine with government-level encryption. In fact, one of the most highly regarded and powerful encryption tools available is both free and open source (our favorite combination!). TrueCrypt allows you to protect either all your data or only what files you choose. You can mask your boot drive and sensitive documents while leaving your games or other nongeneric data in the clear. While no encryption process is without risk, TrueCrypt is designed to put your mind at ease and takes no chances with your data. The process can be reversed at any time even without needing to boot into windows.

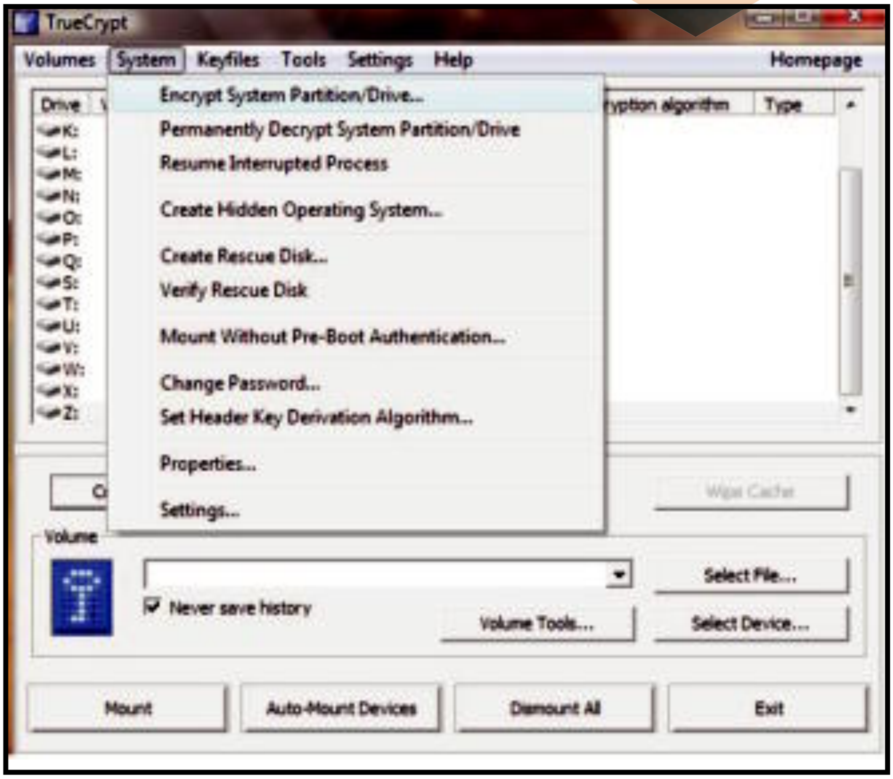
—JUSTIN KERR

1 PREPARE TRUECRYPT WITH THE RIGHT SETTNG

Download TrueCrypt (**www.truecrypt.org**) and install the program. To create an encrypted container for your system drive, click Create Volume on the main screen. To start encrypting a system partition, click the System tab in the top left-hand side of the window, then select Encrypt System Partition/Drive.

The first choice you have to make during the encryption process gives you a pretty good overview of just how many scenarios this suite was designed to handle. If you select the Normal system encryption, each and every sector of your hard drive will be converted to what looks like random noise and can only ever be read with your master password. Most people will want this option.

If you're using a home-built PC, it is safe to click Yes at the next window, which allows TrueCrypt to encode the host protected area. Some OEM machines store recovery data and RAID drivers here. The best way to determine if it's safe to encrypt the host area is to see if



your system has any kind of built-in recovery tools accessible during startup. If it does, and you cannot locate these files on a separate partition, your host area may be in use and shouldn't be encrypted.

It's very important during this stage of the installation to accurately identify if you are dual-booting into multiple OSes. Since TrueCrypt writes its own boot loader to the first sector of the drive, failure to answer this correctly will result in your boot loader being overwritten. Currently, the only multiboot loaders supported are the Windows MBL (this is the default interface that automatically installs with Windows 2000, XP, and Vista) and the Linux alternative Grub. The Multiboot option will move your boot loader from the master boot record to another sector on the hard drive, out of harm's way.

2 SELECT AN ENCRYPTION ALGORITHM AND CREATE A PASSWORD

When you reach the encryption options step, you will be able to pick from the dizzying array of built-in encryption algorithms. But for those of you who don't feel like putting in years of research on the differences of each, we highly recommend selecting AES.

AES, or Advanced Encryption Standard (also known as Rijndael), is the encryption standard used by the U.S. government and is widely regarded as a benchmark in terms of security. In addition to being very robust, it is computationally lightweight. This becomes extremely important, because everything you do from now on will need to be encrypted/decrypted on the fly. The default Hash Algorithm RIPEMD-160 is a good match and doesn't need to be changed. When you're ready to proceed, click Next.

The next screen will allow you to set your master password, and this step is by far the most important. Make sure you choose a strong password.

3 CREATE A RESCUE CD

Next, you will create a rescue CD, which we highly recommend. If something goes wrong during the encryption stage, the rescue CD is the only tool that will allow you to recover your data. The rescue CD contains a utility that will allow you to decrypt your drive or restore your master boot record if it ever becomes damaged. Damage to the MBR can happen in many ways, but it is most often caused by some invasive form of digital rights management that embeds itself in the MBR, or some form of malware like a rootkit.

Your rescue CD is your first and last line of defense. In the Rescue Disk dialogue box, pick a path where TrueCrypt will deposit the recovery CD's ISO file. Find the ISO file and burn it using a free image-burning utility like IMGBurn (**www.imgburn.com**). TrueCrypt will ask you to verify the contents of the rescue CD to make sure you burned it correctly.

4 SCRUB YOUR OLD DATA

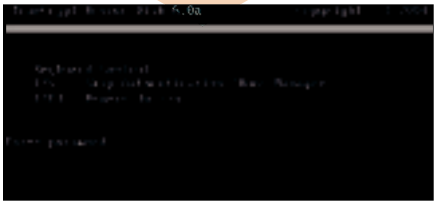
Next, TrueCrypt allows you to wipe any data that you have deleted previously but that might still be recoverable using third-party tools. Because True Crypt will encrypt only your current or new

files, everything deleted in the past will need to be scrubbed.

You have several wipe options available to pick from, and they range in both the amount of time needed and effectiveness. The 3 Pass setting is generally enough to defeat all but the most advanced and expensive governmental tools, while the 35 Pass setting is overkill. Depending on the size of the drive and the setting selected, this step can range from a few hours to several days.

5 RUN THE PRETEST AND BEGIN ENCRYPTION

Next, TrueCrypt is going to test your memory by restarting your computer and giving you the opportunity to enter your master password for yourself. Since no encryption has been performed yet, this is simply a test to make sure you have your login information memorized. From this point forward, forgetting your master password will result in data loss.



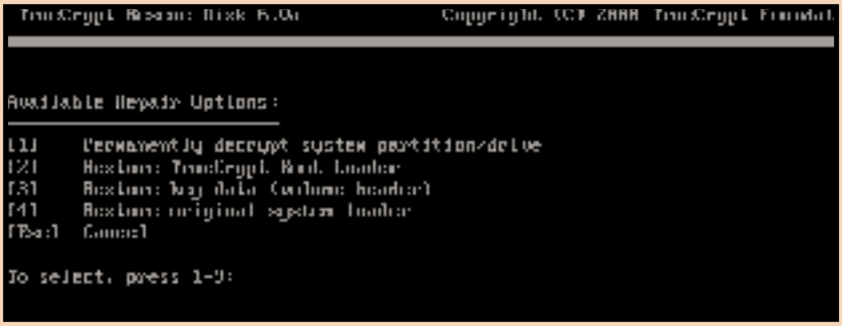
Now, simply click Encrypt to begin the process. You still will be able to use the OS while the encryption process is underway. The TrueCrypt driver keeps track of what data has been encrypted already and operates in the background.

Read more about encrypting your hard drive and troubleshooting with TrueCrypt at ***http://tinyurl.com/b3hbn3***.

IN CASE OF EMERGENCY

Using the Rescue CD

The issue you are most likely to encounter at any given point is corruption of your MBR. This will prevent you from being able to enter your password, and will likely result in errors that would suggest you're dealing with an empty drive. If this proves to be an ongoing problem, the most likely culprit is a recently installed application with an invasive form of DRM, or a rootkit. Keep in mind that all troubleshooting steps require your password. If you forget it, TrueCrypt cannot help you recover your drive. Any back doors or secret methods of decrypting the drive would defeat the security benefits.



When the rescue CD boots, you will have the option to either:

1 PERMANENTLY DECRYPT SYSTEM PARTITION

This restores your system to its original state. Your data will once again be in the clear, as it was before. Your password will be required to begin the decryption, and it's important to note that if you are encrypting several computers, you will need to keep separate CDs. This restore function, as well as all the tasks listed below, is specific to the password you chose before creating the disk. If your password becomes compromised and you decide to change it, you should destroy the old CD, because it can be used to decrypt your machine using the old passphrase.

2 RESTORE TRUECRYPT BOOT LOADER

This will repair a TrueCrypt system that refuses to boot. The rescue CD, however, cannot restore your password. The password is the cipher used to decrypt the information on your hard drive. The TrueCrypt boot loader is simply the means of entering it.

3 RESTORE KEY DATA

If for any reason your password should fail to enter (and you're sure you typed it in correctly), run this function. It will prompt you to enter the password again, only this time it will be verified using encrypted data on the CD. Assuming that it matches the information encoded on the Rescue Disk, it will repair the entry on your hard drive.

4 RESTORE ORIGINAL SYSTEM LOADER

If you used step 1 to decrypt your drive, and you had a multiboot loader installed prior to TrueCrypt's installation, you will want to run this step. When combined with step 1, your system will be completely restored to its pre-encryption state.

REVIEWS

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Falcon Northwest Fragbox II

A lunch-box computer that eats the lunches of bigger PCs

You know when a little person shows up in a Ben Stiller movie he's gonna whoop some ass. Sometimes that's not just a comedy film cliché. Take, for example, Falcon Northwest's size-challenged Fragbox II.

You'd think this Halfling PC would have a hard time competing with full-tilt, big-ass gaming rigs, but Falcon brings its A-game to the table by managing to stuff an overclocked Core i7 into the wee chassis.

This is the third Fragbox II we've seen in recent years and it's also clearly the fastest. With its overclocked 2.93GHz Core i7-940, 6GB of DDR3/1066, Lite On Blu-ray burner, Seagate 1.5TB Barracuda, and a pair of GeForce GTX 285 cards in SLI, this PC is hardly wanting.

The Fragbox II didn't set any Lab records in benchmarks. The majority are still held by Velocity Micro's Raptor Z90, which we reviewed in our Holiday 2008 issue. With its larger and cooler-running desktop case, the Raptor Z9 packed a 3.2GHz Core i7-965 overclocked to 3.66GHz. That's enough to keep the Falcon's slightly overclocked 3.06GHz Core i7-940 at bay.

Falcon does keep things competitive, however, by enabling Turbo Mode, which takes the proc to 3.3GHz in some applications. That's enough to embarrass some far more extravagant rigs. The most glaring example is the $10,000 Hardcore Reactor PC we reviewed in February. The tiny Fragbox II manages to pull even with that monster in our Premiere Pro CS3 benchmark and speeds past the Hardcore in MainConcept Reference encoding and ProShow Producer. Interestingly, the two GeForce GTX 285 cards in the Fragbox II leap ahead of the tri-SLI based Hardcore in Unreal Tournament 3. Why? The Core i7 in the Fragbox II is faster than the Core 2 Extreme in the Hardcore and we run our test at a "low resolution" of 1920x1200. Tri-SLI needs ultrahigh resolutions to overcome its inefficiencies in less GPU-intensive games.

The Fragbox II doesn't just ace outdated Core 2 Extreme PCs, either; it also manages to put a dent in Gateway's FX6800, which we reviewed in April. The Fragbox II turns in better scores in Premiere Pro, ProShow, MainConcept, and both gaming tests since it, surprisingly, has higher specs than the larger Gateway. There's one area where the Fragbox II falls short, though: storage. The Fragbox II's single 1.5TB drive can't keep pace with the SSD and RAID 0 Velociraptors elsewhere, and it gets spanked in our drive-intensive Photoshop benchmark. Falcon does sell an uber SSD version of the Fragbox II, but didn't sample it to us. Pity.

Obviously, you can't cram the same ton of parts in an SFF box that you can with a full-size desktop machine. But it's not something that should take anyone by surprise, so we can't ding the Fragbox II for that. Noise is a different matter. To keep all this hardware cool requires fans. Given the Fragbox II's size, that means smaller, shriller fans. The Fragbox II isn't unacceptably loud, but you won't keep it running in your bedroom at night. You might even notice it if it's in the room next door. Still, the biggest negative is the price. At $4,632, this rig is hardly budget.

It is, however, smaller and faster than a lot of the gaming machines we've seen recently. Heck, it's even cheaper than some of them too.

–GORDON MAH UNG

Think of the Fragbox II as Hervé Villechaize mixed with Samuel L. Jackson.

SPECIFICATIONS

Processor	Intel Core i7-940 (2.93GHz overclocked to 3.06GHz)
Mobo	DFI JR X58-T3H6 microATX using Intel X58 chipset
RAM	12GB DDR3/1066
Videocard	Two GeForce GTX 285 in SLI
Soundcard	Integrated
Storage	Seagate Barracuda 7200.11 1.5TB
Optical	Lite-On PLDS IHES206 Blu-ray burner
Case/PSU	Custom / Silverstone 1000 Watt

BENCHMARKS

	ZERO POINT	
Premiere Pro CS3	1,260sec	613 (106%)
Photoshop CS3	150 sec	168 (-11%)
Proshow	1,415sec	556 (154%)
MainConcept	1,872 sec	1,076
Crysis	26 fps	48
Unreal Tournament	83 fps	146

Scale: 0, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%

Our current desktop test bed consists of a quad-core 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard. We are running two EVGA GeForce 8800 GTX cards in SLI mode, a Western Digital 150GB Raptor and a 500GB Caviar hard drive, an LG GGC-H20L, Sound Blaster X-Fi, and PC Power and Cooling Silencer 750 Quad. OS is Windows Vista Home Premium 64-bit.

MAXIMUMPC KICK ASS!

VERDICT **9**

FALCON NORTHWEST FRAGBOX II

+ BILBO	**− GOLLUM**
Faster than big, bad gaming desktops and almost fits under an airplane seat.	Slightly noisy and could use faster disk I/O for the price.

$4,632, www.falcon-nw.com

CyberPower Extreme M1

Good for gaming, but is it worth the price?

With eSATA, 802.11n Wi-Fi, Bluetooth, HDMI, a webcam, a fingerprint reader, an Express Card slot, and a media reader, the Extreme M1 has you covered for features.

At $2,300, CyberPower's Extreme M1 17-inch gaming notebook is the antithesis of the budget Gateway P-7811 FX we've been raving about for months. The most obvious extravagance you get for the higher price is dual-GPU graphics in the form of two ATI Radeon HD 3870 cards in CrossFireX. The Extreme M1's 2.53GHz T9400 Core 2 Duo CPU is also 270MHz faster and features twice the cache as the Gateway's proc, its 320GB hard drive is more than 50 percent bigger, and its optical drive supports Blu-ray playback.

The question is, how do these extras translate in performance? Compared with our zero-point notebook, the Extreme M1 excelled in all the benchmarks to varying degrees—not surprising, given the zero-point's age. Against the Gateway P-7811 FX, there was a little more give and take. For example, in the ProShow Producer and MainConcept benchmarks, CyberPower's rig had gains hovering around 10 percent, which is proportionate to the M1's clock-speed advantage over the Gateway's 2.26GHz CPU. But in our Photoshop benchmark, the Extreme M1 was actually around 7 percent slower than Gateway's P-7811 FX.

Gaming was an even more interesting story. We didn't expect the dual-GPUs in the Extreme M1 to really flex their muscle in our standard notebook benchmarks, as FEAR and Quake 4 aren't that graphically intensive, particularly at the mild settings we use in our mobile tests. But we certainly weren't expecting the Extreme M1 to turn out just 28fps in FEAR—that's 74 percent slower than Gateway's budget machine. Without any clear explanation for the performance lag, we forged on. In Quake 4, the Extreme M1 was a more expected 7 percent faster than Gateway's P-7811 FX.

We went a step further and tested the Extreme M1 with our desktop gaming benchmarks as well. After all, the CrossFireX graphics should be up to the task of more graphically challenging titles. And sure enough, we were able to run Crysis at the M1's 1920x1200 native resolution and set to Very High Quality, albeit at just 15fps. With Unreal Tournament 3, the Extreme M1 surpassed even some gaming desktops with 114fps. Gateway's P-7811 FX, with its single GeForce 9800N GTS, achieved half the frame rate in those two games: 8fps and 74fps for Crysis and UT3, respectively. Indeed, the overall gaming prowess of the Extreme M1 convinced us that the FEAR score is likely the result of a driver issue and not any hardware shortcoming.

Yet despite its competence as a gaming rig, we have some reservations about the Extreme M1. It's heavier than most gaming notebooks, weighing close to 13 pounds with its power brick; its 12-cell battery can't supply juice for a full two hours—we got one hour and 50 minutes through a standard-def DVD in power-saving mode; and its speakers are weak and tinny. Even more troubling, the Extreme M1 doesn't feel all that sturdy to us: There was a slight buckling to the strip of touch-sensitive controls above the machine's keyboard, and the lid of the notebook showed scratches after just a few days of indoor use—it's little consolation that the scratches were camouflaged by all the smudges and fingerprints that quickly covered the machine's shiny black veneer. For the price of this notebook, we'd expect better quality.

—KATHERINE STEVENSON

SPECIFICATIONS

CPU	Intel 2.53GHz Core 2 Duo Mobile T9400
RAM	4GB DDR3/1,066MHz
Chipset	Intel PM45
Hard Drive	Western Digital 320GB WD3200BEKT-22F3T0 (7,200rpm)
Optical	HL-DT-ST BDDVDRW CT10N
GPU	Dual ATI Radeon HD 3870 (CrossFireX)
Boot/Down	37 sec / 49 sec
Lap/Carry	9 lbs, 11oz / 12 lbs, 12oz

BENCHMARKS

	ZERO POINT	
Premiere Pro CS3	1,860 sec	1,517
Photoshop CS3	237 sec	207
Proshow	2,416 sec	1,834
MainConcept	3,498 sec	3,270
FEAR 1.07	14 fps	28 (100%)
Quake 4	29.1 fps	142 (+388%)

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our zero-point notebook uses a 2.6GHz Core 2 Duo E6700, 2GB of DDR2/667 RAM, an 80GB hard drive, a GeForce Go 8600M, and Windows Vista Home Premium.

VERDICT 8

CYBERPOWER EXTREME M1

+ DAWN OF WAR II
Packed with features; big, glossy 17-inch display; desktop-caliber gaming.

− HALO WARS
Pricey, heavy, poor battery life, bad speakers.

$2,300, www.cyberpowerpc.com

Intel DX58SO

Core i7 performance with the reliability of an Intel motherboard

Rifling through the box that the Intel DX58SO "Smackover" board came in, we were surprised not to find "love" and "hate" brass knuckles, because the motherboard definitely conjures feelings of both extremes.

If you think we're being disrespectful, just take one look at the board's SATA ports. That will tell you that somebody at Intel still doesn't know that today's graphics cards are big, huge, honking affairs. Since Intel oriented all the SATA ports vertically, you'll have a hell of a time accessing the ports with a dual-slot GPU parked overhead.

And if that doesn't make you bust out the hate knuckles, the memory slots might.

BENCHMARKS

	Intel DX58SO	DFI LAN Party UT X58
PC Mark Vantage x64	**7,082**	6,597
ProShow (min:sec)	**9:12**	10:01
MainConcept (min:sec)	18:00	18:10
3DMark Vantage CPU	45,424	**46,541**
HD Tach (MB/s)	185	**213**
Valve Particle test (fps)	155	156
Quake 4 (fps)	224	**234.9**
UE Mem Copy (MB/s)	**19,182**	18,768
UE Mem Latency (ns)	31.9	32.8
SiSoft Sandra RAM (GB/s)	26.3	26.7

Best scores are bolded. Our test bed consists of a Core i7-965 Extreme Edition CPU, 6GB of Corsair DDR3/1600, an EVGA GeForce GTX 280 videocard, a PC Power and Cooling Turbo Cooling 1200 power supply, a WD Raptor 150GB drive, and Vista Home Premium 64-bit. HD Tach scores were achieved using an Intel X25-M SSD.

We've seen four previous boards for the Core i7—two from Asus, one from DFI, and an MSI mobo—and all have had six DIMM slots so you could run up to 12GB of RAM and maintain tri-channel mode. Not Intel's.

Intel opted to put four DIMM slots on the board. Just how the hell do you run tri-channel mode with four sticks of RAM? You can't. The fourth slot shares bandwidth with one of the other DIMMs. As you can imagine, this will impact your performance. Intel even recommends that you use only three slots. If you absolutely must have additional capacity, the company says, you can fill the fourth slot, but at a cost to memory bandwidth.

Also odd is Intel's decision to support CrossFireX but not SLI for months on end. It was only as we were finishing this review that Intel decided to add SLI in a future BIOS. A little late in the game, but better than a slap in the face.

You're probably wondering where the love is because it's all been hate thus far. Unlike most other Intel chipset rollouts, the X58 has been less than smooth. Every other X58 board we've tested has gone through multiple BIOS revisions to get things right. The DX58SO, however, has been utterly trouble-free. No weird USB issues, no problems with Turbo Mode. Hell, the DX58SO is even a pretty decent overclocker. We used the DX58SO to push a Core i7 920 to 3.8GHz and it was rock solid. As boring as it is, the board never gave us a hiccup.

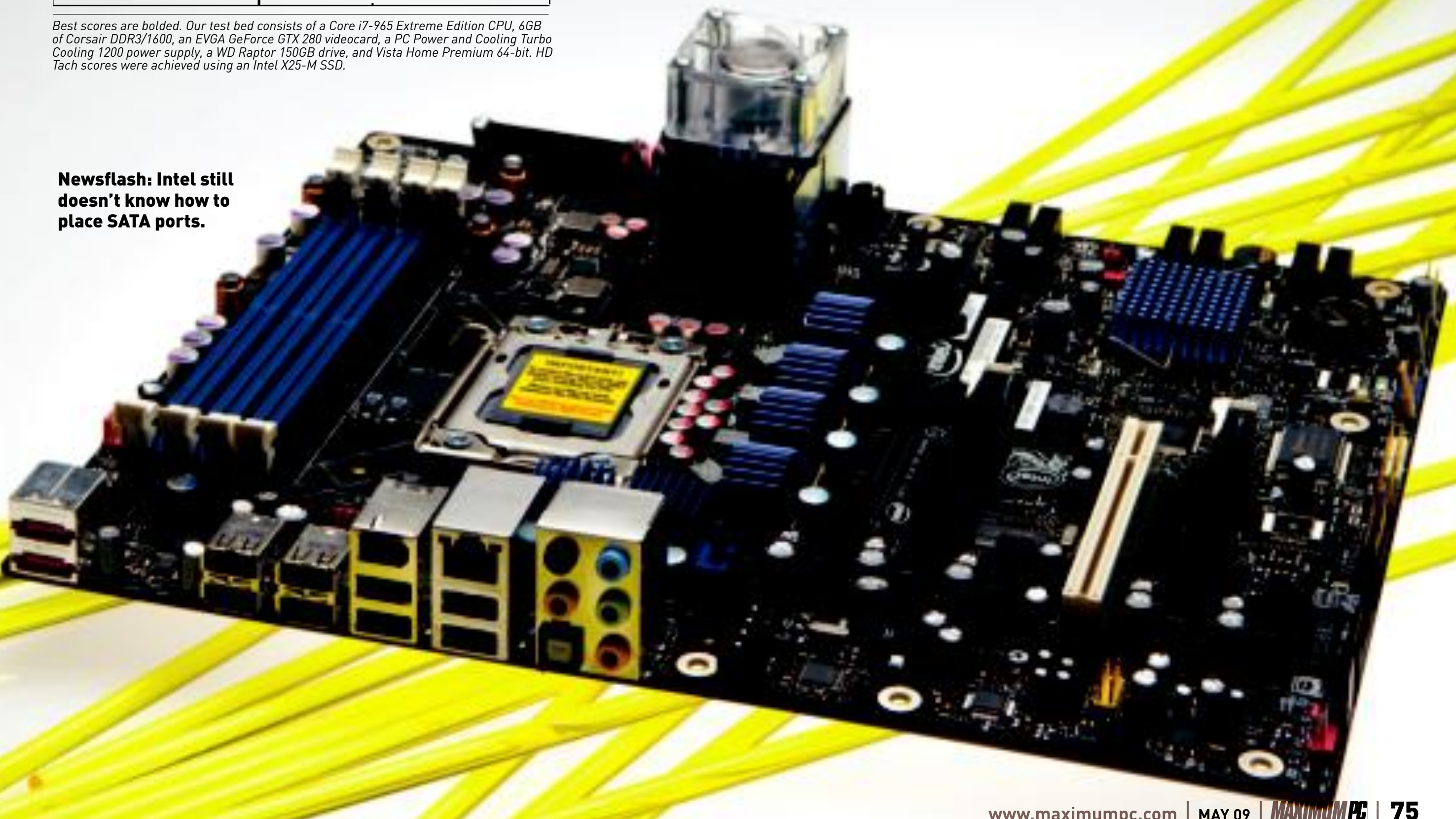
Would we build an uber-bling-bling machine around this board? No. Would we build a machine that our significant other or parents would use? You betcha.

—GORDON MAH UNG

INTEL DX58SO — VERDICT **7**

+ DO THE RIGHT THING	– SCHOOL DAZE
Good performance with the safe embrace of the Intel name.	Four DIMM slots and funky SATA ports make us mad. Very mad.

$280, www.intel.com



Newsflash: Intel still doesn't know how to place SATA ports.

Dell XPS One 24

This all-in-one dares to take on our zero-point rig

All-in-one PCs like Dell's XPS One 24 aren't the most powerful computers on the market and they know it. Like thin-and-light notebooks, they trade brute power for a thin, stylish profile and quiet operation—and we're absolutely fine with that. We'd never give up our benchmark-crushing uber rigs for an all-in-one, but a good one can be a terrific second PC for the kitchen, living room, or bedroom.

Don't take that to mean the XPS One 24 is wimpy, though. It's far more powerful than the HP TouchSmart we reviewed in the Holiday 2008 issue (you'll find our review at http://tinyurl.com/dxcxkf), thanks to a foundation based on Intel's 2.33GHz Core 2 Quad Q8200 CPU, a respectable mobile GPU (Nvidia's GeForce 9600M GT with a 512MB frame buffer), and a desktop 750GB hard drive. The trade-off for that power is heat and noise: The components in Dell's machine produce more heat than the parts HP chose, and Dell compounded its thermal issues by sticking the power supply inside the chassis (HP uses an external brick). So, while the TouchSmart is all but silent, the cooling fan in the XPS One 24 emits a slightly annoying whine.

Noise aside, when we sat the Dell and the HP side by side, we were surprised at how much more screen real estate the Dell has to offer—we hadn't realized what a difference two inches could make. It's not a touch screen, but it does boast volume and media-playback controls hidden in its bezel that light up when your finger comes near (a proximity sensor is responsible for this parlor trick). The screen has a native resolution of 1920x1200, but you have to move up to the "Product Red" model ($2,200) to get a Blu-ray drive.

The XPS One 24's footprint isn't as large as you might think, but it probably won't fit in your armoire-style desk: The machine emerges from a glass base that measures just 13 inches wide and eight inches deep, but the JBL speakers permanently mounted to the left and right of the display render the computer about four inches wider than the typical 24-inch monitor. The base cannot be removed, so there's no way to hang this computer on the wall. The JBLs, meanwhile, are better than what you'd typically find incorporated into a display, but that's not saying much. They're much too bright and lack enough bottom end to deliver an enjoyable performance with movies and music.

We've been reluctant to benchmark this class of PC because the zero-point rig we use as our basis of comparison is by design the polar opposite of an all-in-one. It wouldn't be fair to belittle an all-in-one for being a slow gamer because it's not designed for that—so we don't. But the CPU in the XPS One 24 is only slightly slower than our zero-point and the machine has twice as much memory, so we decided to see what this baby could do with our productivity benchmarks. As you can see from the benchmark chart, it delivered respectable performance, edging past our zero-point in three of the four tests. Not bad.

We dig that we can tilt the Dell's XPS One 24, but it would be even better if it could swivel, too.

These numbers make it a PC capable of medium-duty video editing and certainly able to handle anything a digital camera could throw at it. There are faster, bigger, and badder machines, but they wouldn't be as sexy. **—MICHAEL BROWN**

SPECIFICATIONS

Processor	Intel Core 2 Quad Q8200 (2.33GHz)
Mobo	Dell proprietary
RAM	4GB DDR2/800 (two 2GB sticks)
Videocard	Nvidia GeForce 9600M GT
Integrated TV Tuner	AVerMedia A317 Hybrid NTSC/ATSC TV Tuner
Soundcard	Realtek ALC262 onboard
Storage	750GB Seagate ST3750630AS (7,200rpm)
Optical	Teac DV-W28SLC DVD-RW

VERDICT 8

DELL XPS ONE 24

+ BIG RED ONE
Beautiful display; wireless keyboard features a built-in track pad; fast (for an all-in-one).

– ONE LIFE TO LIVE
No Blu-ray drive; keyboard lacks a numeric keypad; speakers sound harsh; annoying fan noise.

$1,900, www.dell.com

VISTA 32-BIT BENCHMARKS

	ZERO POINT	
Premiere Pro CS3	1,241 sec	1,206
Photoshop CS3	153 sec	169 (-9%)
Proshow	1,540 sec	1,206
MainConcept	2,079 sec	2,049

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our current desktop test bed consists of a quad-core 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard. We are running two EVGA GeForce 8800 GTX cards in SLI mode, a Western Digital 150GB Raptor and a 500GB Caviar hard drive, an LG GGC-H20L, a Sound Blaster X-Fi, and a PC Power and Cooling Silencer 750 Quad. The OS is Windows Vista Home Premium 32-bit.

Nvidia's new GeForce GTX 285 is the fastest single-GPU board we've tested, but it's roundly smacked by ATI's dual-GPU 4870 X2.

Asus GeForce GTX 285

The spring update to the GTX 280 delivers a touch more speed

Last month, we reviewed Nvidia's GeForce GTX 295, a dual-GPU GT200-based board that benefited from a die-shrink from 65 nanometers to 55 nanometers. This month, we're testing the GTX 285, which uses the same silicon as the GTX 295, in a clocked-up single-GPU design. Unfortunately, the paltry clock-speed improvements that the die shrink allowed don't deliver enough of a performance boost to make this board worth recommending, especially for folks who already own a GTX 280 board.

When you compare the GTX 285 to the GTX 280, you can see what the problem is. The GTX 285's GT200 core is clocked at 648MHz, up from 602MHz for a stock GTX 280. The 1GB of GDDR3 memory runs at just 621MHz on a 512-bit bus—the GTX 280's memory runs at 550MHz. The upshot is that this new card delivers less than a 10 percent performance increase over the GTX 280 parts in most benchmarks. The only big gains over the 280 are at lower resolutions with very high antialiasing and anisotropic filtering levels. The big gain is in power consumption. The 285 features a TDP of about 183W, while the 280 drew a massive 236W. That means that the 285 will actually run in a system that's equipped with just a pair of 6-pin PCI-E video connectors—you don't need the 6-pin and 8-pin combo that's been de rigueur for the last few months.

Looking at the benchmarks, it's clear that this isn't a good upgrade for anyone with a GTX 280, Radeon 4870 X2, or even a GTX 260 Core 216. Who is this card for? In short, anyone who's still running a last-gen card. That means G92-series for Nvidia, or a 4850 or slower board from ATI. However, it's not a particularly good deal, even though it's the fastest single-GPU board we've tested. When you compare its performance to ATI's 4870 X2 boards, it gets spanked. With a street price of about $380 at press time, it's significantly outperformed by ATI's dual-GPU 4870 X2 boards, which cost just $30 to $80 more, depending on vendor and bundle.

Other than the die-shrink and clock-speed increases, the GTX 285 offers exactly the same feature set as the GTX 280. It supports HDMI, including audio pass-through, accelerated video decode, support for accelerating CUDA and PhysX apps, and a host of features designed to make rendered video look fantastic. When the price of these boards come down some, they'll be worthy upgrades. Until then, you're better off saving a few more pennies and buying a much-faster dual-GPU board. —WILL SMITH

VERDICT 8

ASUS GEFORCE GTX 285

+ DOUBLEMINT
Fastest single-GPU card we've tested. Much lower power consumption than the GTX 280.

− BIG RED
Slower than a 4870 X2, but about the same price. Negligible speed increase over a GTX 280.

$380 (street), www.asus.com

BENCHMARKS

	GeForce GTX 285	GeForce GTX 280	ATI Radeon 4870 X2
Driver Version	182.08	180.48	9.1
Crysis 4X AA/ Very High (fps)	20.32	18.35	**29.7**
Crysis no AA/ Very High (fps)	24.76	22.28	**31.5**
Call of Duty (fps)	**74.6**	68.09	**105.5**
Vantage Game 1 (fps)	**19.45**	17.32	**23.91**
Vantage Game 2 (fps)	14.26	13.11	**19.36**
Far Cry HQ, 1920x1200, no Physics, no AI (fps)	**57.91**	52.2	**69.14**
Far Cry HQ, 1680x1050, no Physics, no AI (fps)	**65.11**	58.7	**73.1**

Best scores are bolded. Benchmarks are run on an Intel Core 2 Quad Q9770 Extreme with 4GB of memory running Windows Vista. Crysis and 3DMark Vantage are run at 1920x1200 with 4x AA and 8x anisotropic filtering, unless otherwise noted. Call of Duty is run at 2560x1600 with 4x AA.

Seagate Barracuda 7200.12 1TB

Introducing the first two-platter terabyte drive

It was a big month for storage. Not only did Western Digital bring to the market the first 2TB consumer hard drive (page 82), but Seagate came to the game with another milestone: a two-platter 1TB drive. Both offerings contain 500GB platters, the highest platter density yet achieved.

The Barracuda 7200.12 1TB is the first drive we've tested from the 12th generation of Seagate's 7,200rpm Barracuda line, and it's Seagate's best chance for a fresh start following the firmware issues that plagued its 7200.11 line.

The 1TB 7200.12 has much in common with drives from the previous generation of Barracudas: It features 32MB of L2 cache, 7,200rpm rotational speeds, and SATA 3Gb/s data transfer with Native Command Queuing. The 7200.12, though, needs just two platters to achieve 1TB, whereas the 7200.11 used four.

Generally, fewer platters mean higher areal density, which translates into better performance. For example, our previous favorite terabyte drive, the Samsung Spinpoint F1 HD103UJ, used three platters and outperformed the older Barracuda's four platters. So surely a two-platter drive will be faster, right?

Yup. The new 1TB Barracuda's read and write speeds approach those of the Western Digital Velociraptor. The Barracuda's average sustained reads in our h2benchw benchmark exceeded 100MB/s, 7 percent faster than the Samsung's, while sustained write speeds were an impressive 99.3MB/s, nearly 14 percent faster than the Samsung drive. Random access reads were more than 25 percent quicker on the Barracuda, burst speeds were 24MB/s faster, and the Barracuda's PCMark Vantage score was more than 25 percent higher than the Samsung's. In fact, only the Barracuda's random-access write speeds failed to beat the Samsung's—at 15.2ms, they're still zippy, but no match for the Samsung's 9.8ms response time.

The 1TB 7200.12 drive has a list price of $150 and a street price of about $120, which puts it in direct competition with its older, bigger cousin, the 1.5TB Barracuda 7200.11—which has retailed for around $140 consistently for months. The 2TB Western Digital Caviar Green fetches $300.

As appealing as the Caviar's eco-friendly message may be, you can actually save money by buying two of the 7200.12 drives—and get better performance to boot.

—NATHAN EDWARDS

The next-generation Seagate Barracuda is wicked-fast.

BENCHMARKS

	Seagate Barracuda 7200.12 1TB	Samsung Spinpoint F1 HD103UJ 1TB
h2benchw Average Sustained transfer Rate Read (MB/s)	**100.4**	93.2
h2benchw Average Sustained transfer Rate Write (MB/s)	**99.3**	86.0
h2benchw Random Access Read (ms)	**14.5**	20.59
h2benchw Random Access Write (ms)	15.2	**9.8**
HDTach Burst Read (MB/s)	**217**	193
PCMark Vantage Overall Score	**5,323**	4,252

Best scores are bolded. Our test bed uses a 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard, one EVGA GeForce 8800 GTX card, a Western Digital 500GB Caviar hard drive, and a PC Power and Cooling Turbo Cool PSU. Scores for h2benchw and HDTach were generated in Windows XP Professional with SP2. PCMark Vantage scores were run in Windows Vista Home Premium 32-bit.

MAXIMUMPC KICK ASS!

VERDICT 9

SEAGATE BARRACUDA 7200.12 1TB

+ SHARKTOPUS	− OCTOHORPE
First two-platter 1TB drive; wicked-fast. Beats previous contender easily.	Somewhat high MSRP; higher random-access writes than expected.

$150, www.seagate.com

The 2TB Caviar Green makes up in capacity what it lacks in speed.

Western Digital Caviar Green 2TB

Hands-on with the first two-terabyte consumer hard drive

Two things get people excited about hard drives: speed and capacity. Western Digital already holds the performance crown with its much smaller Velociraptor, but now the company owns capacity, too, with its new Caviar Green 2TB WD20EADS.

The Caviar packs a full 500GB more onto its four platters than our previous capacity champion, Seagate's 1.5TB 7200.11 Barracuda. But while the Barracuda married capacity with performance, the Caviar instead opts for low acoustics and low power consumption. How low? The Caviar is rated at 2.8 watts at idle, while the Barracuda idles at 8.3 watts. For a single computer, the power reduction is minimal, especially when it's sitting in a machine with a CPU that eats 130 watts and that has two 300-watt GPUs cranking away. But for the low-power-consumption crowd, we can't see it getting better than this. The Caviar's power savings come by varying the rotation speed on its 400Gb/square-inch platters between 5,400rpm and 7,200rpm.

But how much performance are you willing to give up for that Green badge? With the Caviar, the trade-off is significant. Even with a 32MB cache, this isn't the drive for speed freaks. The Caviar's read speeds, for example, are about 25 percent slower than those of the Barracuda in h2wbench, and PCMark Vantage puts the Caviar about 15 percent behind the Seagate drive.

Random-access read times for both drives are around 12ms, while the Caviar's random write latency is around 6.7ms, 1.4ms slower than the Barracuda's.

The Caviar can't match the read or write speeds of this generation's terabyte drives, much less the 1.5TB Barracuda or the Velociraptor, but the drive's big selling points are capacity and power savings. In those two categories, it is unbeatable. And the memory of the 1.5TB Barracuda's firmware issues might scare off folks considering that drive. Though we weren't among the small percentage of people affected by the 7200.11 generation's firmware issues, the Barracuda will probably be tarred with that brush for a while. That essentially makes the Caviar twice the size of its nearest competitors. That's something to be lauded even if you don't tool around in a Prius or keep to a strict carbon-footprint diet.

—NATHAN EDWARDS

BENCHMARKS

	WD Caviar Green 2TB	Seagate Barracuda 7200.11 1.5TB
h2benchw Average Sustained transfer Rate Read (MB/s)	—	
h2benchw Average Sustained transfer Rate Write (MB/s)		
h2benchw Random Access Read (ms)		
h2benchw Random Access Write (ms)		
HDTach Burst Read (MB/s)		
PCMark Vantage Overall Score		

Best scores are bolded. Our test bed uses a 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard, one EVGA GeForce 8800 GTX card, a Western Digital 500GB Caviar hard drive, and a PC Power and Cooling Turbo Cool PSU. Scores for h2benchw and HDTach were generated in Windows XP Professional with SP2. PCMark Vantage scores were run in Windows Vista Home Premium 32-bit.

VERDICT 9

WESTERN DIGITAL CAVIAR GREEN 2TB

+	−
Highest-capacity consumer drive on the market; low power consumption; quiet.	Not particularly fast; the extra 500GB costs more than $100.

$300, www.wdc.com

Lite-On iHAS422

DVD drive déjà vu

Now that Lite-On is sharing the same drive manufacturing line as Plextor (not to mention Sony, HP, and Philips), you might wonder whether there is any difference between this 22x DVD burner and the Plextor PX-850SA 22x burner we reviewed in March. In fact, the two burners are virtually the same in terms of parts and mechanics, so differences really come down to the firmware each company uses and the tweaks and optimizations each makes to the final product.

The first thing we discovered is that Lite-On didn't tweak this drive with an overspeed feature. So, like the Plextor PX-850SA, the burner stayed within the confines of the DVD+R media's 16x rating, writing 4.38GB of data to a single-layer disc in 5:43 (min:sec). Samsung's SH-S223, which can reach 20x-plus speeds when writing to 16x media, was almost a minute faster, at 4:46.

There was also little difference between the two drives' performance with double-layer media. The Lite-On's 8x rating for DVD+/-R DL enabled the drive to write 7.96GB of data to a disc in 16:36 vs. the Plextor's 16:33—both considerably slower than the 13:13 achieved by Samsung's SH-S223, rated at 16x for DL media. But the Lite-On (like the Plextor before it) was superior to the SH-S223 at reading double-layer video discs, taking 10:16 to rip the contents of a movie DVD, compared with the Samsung's 15:26.

By now it hardly seems necessary to say that the Lite-On's performance writing data to DVD-RW media (14:54) and also reading the same disc (6:37) was on a par with the Plextor drive's. It was quite clear from our testing that, though it may be possible for vendors to achieve noticeable differences in performance on identical hardware, that's not the case here. The only things differentiating the Lite-On iHAS422 from the Plextor PX-850SA are the Lite-On's less stylish faceplate, older software (Nero 7 Essentials vs. Roxio Creator 10 CE), and much lower price ($40 vs. $75).

—KATHERINE STEVENSON

BENCHMARKS

	Lite-On iHAS422	Plextor PX-850SA	Samsung SH-S223
DVD+R Write Speed Average	11.82x	11.81x	**14.94x**
DVD+R Read Speed Average	12.14x	12.16x	12.16x
Access Times (random/full)	**113/174ms**	**113/175ms**	117/204ms
DVD+DL Write Speed Average	6.99x	6.99x	**9.12x**
DVD Ripping (min:sec)	**10:16**	10:43	15:26/8:13*

*Best scores are bolded. Our test bed is a Windows XP SP2 machine using a 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard, one EVGA GeForce 8800 GTS card, a Western Digital 500GB Caviar hard drive, and a PC Power and Cooling Turbo Cool PSU. All tests were conducted using Verbatim media and Nero CD DVD Speed, except the ripping test, in which we time how long it takes to copy the contents of a double-layer DVD to a Velociraptor hard drive. *Time after third-party patch.*

LITE-ON IHAS422 VERDICT **9**

+ ADAPTATION	– IT TAKES TWO
Same respectable performance as the Plextor PX-850SA; lower price.	Lacks over-speed feature; rated at just 8x for DVD+/-R DL.

$40, www.liteonit.com

Behind the signature Lite-On faceplate is a drive that might as well be from Plextor.

Antec Nine Hundred Two

Antec improves its flagship gamer's midtower but takes few risks

To quote Yogi Berra, "It's like déjà vu all over again!" The Antec Nine Hundred Two is a refresh of Antec's well-loved and much-imitated Nine Hundred midtower gaming chassis. And although the Nine Hundred Two does boast several refinements over its predecessor, it's not exactly revolutionary.

First we'll talk about what the Nine Hundred Two has in common with its predecessor. Both cases are matte black steel with plastic side windows, mesh-style front bezels, and are nearly the same size: At 19.4 x 8.6 x 18.6 inches, the Nine Hundred Two is barely a half-inch wider than the Nine Hundred and a fifth of an inch deeper.

Like the Nine Hundred, the Nine Hundred Two comes with four fans: a 20cm low-rpm Big Boy on top, and three 12cm blue LED fans—one in the rear and one on the front of each three-slot hard drive bay. Here we see some improvements on the Nine Hundred: All the fans now include blue LEDs (and the front ones have intake filters). Fan speed controllers are now mounted directly into the case, with the two front fans controlled by variable speed knobs in the front bezels and the top and rear fans controlled by switches on the case's back plate. On the Nine Hundred, the fan controllers were ugly white and dangled loose inside the case.

The interior of the case is painted matte black, unlike the unfinished steel of the Nine Hundred, and the motherboard tray now features a few cable-routing cutouts and ties on the rear. Gone is the front-panel FireWire port, replaced with eSATA, which we find much more useful.

System installation is virtually identical to the Nine Hundred. As in the Nine Hundred, large videocards like the Nvidia GTX 280 stick out into the hard drive bays by about half an inch, blocking one 3.5-inch slot (out of six) per videocard. There's simply no room.

One change we appreciate: The Nine Hundred Two has a classy black-painted interior.

Where the Nine Hundred Two differs from its predecessor in terms of installation, it veers towards usability. Cutouts and tie-downs on the motherboard tray, both new in the Nine Hundred Two, make cable routing easier. Drive installation, though, could be better—it's 2009; can't we have screwless drive bays yet? Especially egregious is hard drive installation, which requires unscrewing the eight thumbscrews that hold the hard drive case, using four long screws to install the hard drive into a vibration-damping bay, and reinstalling. That's the opposite of screwless.

Insofar as we liked the Nine Hundred, the Nine Hundred Two is a conservative success—it mostly replicates the Nine Hundred, with a few modest improvements. But the Nine Hundred is a two-and-a-half-year-old design, and we were hoping for a little more oomph.

—NATHAN EDWARDS

The Antec Nine Hundred Two is aptly named; it's only slightly better than the fan favorite Nine Hundred.

VERDICT 8

ANTEC NINE HUNDRED TWO

+ NIN	**− 90210**
Improves on the Nine Hundred's winning formula with a few subtle refinements	A bit too subtle. And who do we have to kill to get some screwless drive bays?

$160, www.antec.com

Thermaltake BigTyp 14 Pro

It's big, mean, loud, and it doesn't play well with others, but it gets the job done

At five inches high, 6.14 inches square at the top, and weighing a few ounces shy of two pounds, the Thermaltake BigTyp 14 Pro is among the biggest and heaviest coolers we've tested—although it's not as big as Cooler Master's V10, reviewed last month.

The BigTyp 14 Pro contains six heat pipes routed through aluminum fins mounted perpendicular to the motherboard and is topped with a plastic shroud and 14cm variable-speed fan, which blows hot air straight down instead of through the back of the case, like with most performance coolers. Two retention clips screw into the base and are fastened with nuts on the underside of the motherboard, just like with the Cooler Master V10. Installing the BigTyp 14 Pro is easier than the V10—it's smaller and lighter, it won't bump up against crucial components like RAM, and the nuts can be screwed in with a Phillips screwdriver as opposed to a hex wrench. But there's no room for a 12cm rear fan with the BigTyp installed.

The support brace that reinforces our Cooler Master ATCS 840's removable motherboard tray and backplate got in the way of the BigTyp's plastic shroud. We're not sure who to blame for this: Cooler Master for putting a brace so close to the top left of the motherboard, or Thermaltake for creating such an enormous cooler? Regardless, the cooler should install fine in most other chassis. (We ended up Dremeling out a corner of the cooler's shroud to make it fit.)

At low fan speeds, the BigTyp 14 Pro outperforms our stock cooler, and at top howling speeds it's a match for our favorite, the Zalman CNPS 9900. But even at $20 cheaper than the Zalman, the BigTyp won't be taking the top slot. It's too big and it messes up internal airflow by requiring removal of the 12cm back fan and routing its hot air straight down onto the mobo instead of onto the back of the case. —NATHAN EDWARDS

BENCHMARKS

	BigTyp 14 Pro (low)	BigTyp 14 Pro (high)	Zalman CNPS 9900	Stock Cooler
Idle (C)	33.25	**30**	31.75	45.75
100% Burn (C)	63.75	47.25	**47**	70.25

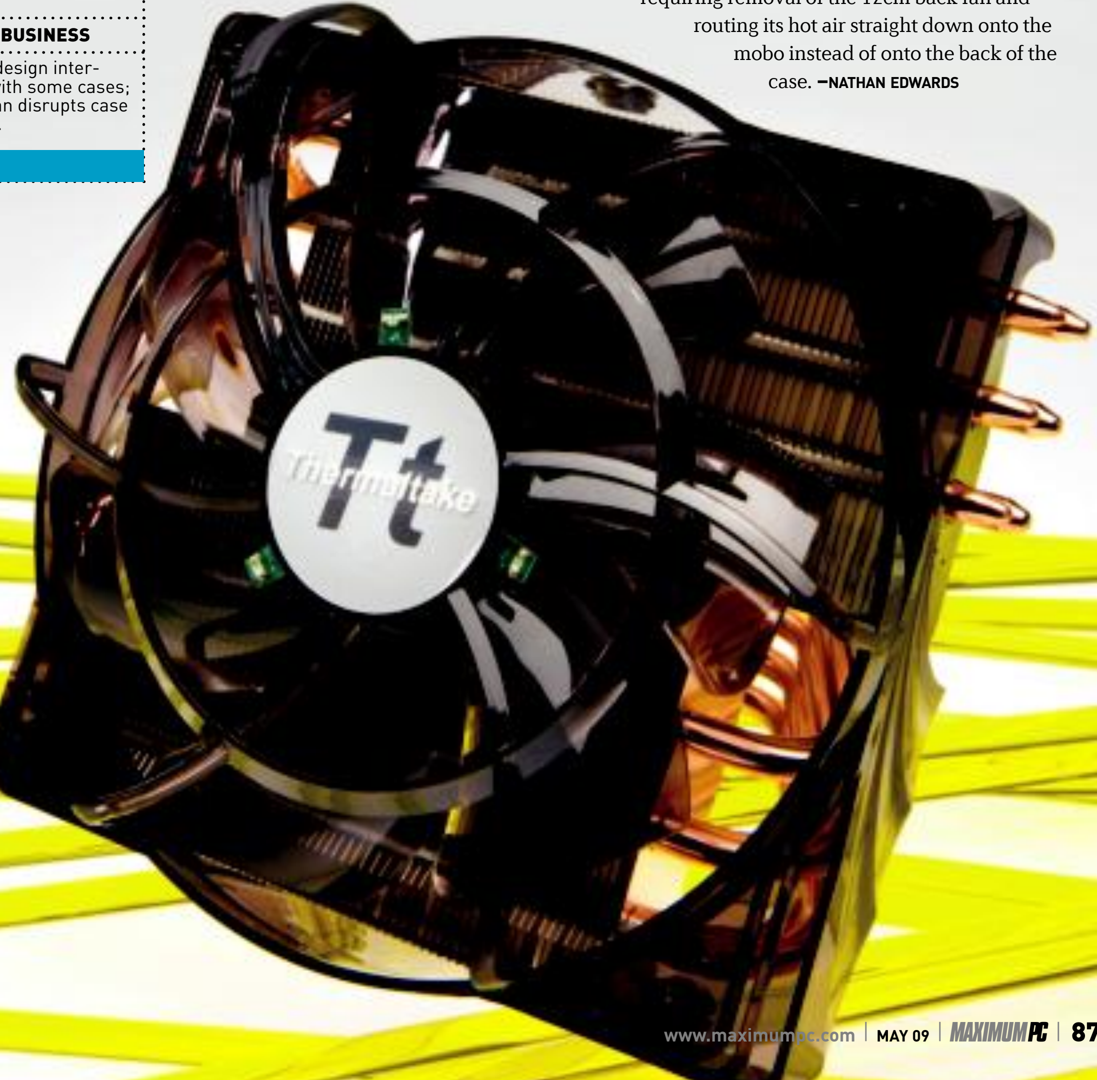
Best scores are bolded. Idle temperatures were measured after an hour of inactivity; load temperatures were measured after an hour's worth of CPU Burn-In (four instances). Test system consists of a stock-clocked Q6700 processor on an EVGA 680i motherboard.

VERDICT 7

THERMALTAKE BIGTYP 14 PRO

+ BIG RED	− BIG BUSINESS
Performs well at maximum settings.	Large design interferes with some cases; loud; fan disrupts case airflow.

$70, www.thermaltake.com



The Thermaltake BigTyp 14 Pro is big enough to cause problems with some cases.

Clickfree Transformer

Keeping backups simple, stupid

With the Transformer residing between your PC and a USB hard drive, all your data can be backed up (or restored) effortlessly.

Clickfree's Transformer may look like an overweight USB key, but it is—forgive us, Optimus Prime—more than meets the eye.

Plug any generic external USB hard drive into the Transformer, then plug the Transformer into a USB port on your PC, and a backup app auto-launches and starts a countdown to begin an automatic file backup of common file extensions. You can interrupt the countdown and add more file extensions that the app doesn't recognize by default. The document formats it grabs are fairly extensive, but if you want it to also copy that comic book archive in .cbr format, you'll need to add the extension first.

You use the same application to restore your documents; you can choose to restore individual files or all of them, if needed. The files are stored in plain view on the hard disc, and even better, this doesn't preclude you from using the drive for other purposes. And instead of converting your drive to some obscure ST disk format that you wouldn't be able to access should you lose the Transformer, you can access the drive from another PC.

There's very little to dislike about the Transformer, except that it's too focused on file-based backups with common extensions. The backup will ignore .exe files—so if you purchased an app that you save in a folder on your desktop, you'd better remember to add the extension. We think the Transformer app should automatically back up *all* files on the desktop and in My Documents, on general principle, regardless of the extensions.

Still, that's a weakness that will only hurt nerds in an HD failure. This is a great solution for those friends and family members who never manage to back up their PCs. The Transformer will do the job and do it easily, which means that it will get done.

—GORDON MAH UNG

CLICKFREE TRANSFORMER — VERDICT **8**

+ HD VIDEO	– HD CRASH
Backing up doesn't get any easier than the Transformer.	Too focused on extension-based document backups; may miss critical .exe files.

$60, www.clickfree.com

Burnout Paradise

An open-world arcade racing experiment in Detroit debris

Don't tell Newton: Ramming your hot rod full-speed into a concrete block, idling minivan, or in-game ad billboard in Burnout Paradise doesn't really slow you down. The game is a steady, fuel-injected dose of momentum from spark plug to finish line. Pushing over Paradise City's 20 square miles of pavement for just an hour means accumulating new cars, completing events, knocking over barriers to find shortcuts or spontaneous jumps, earning license upgrades, setting street-specific high scores, or just streaking a newfound scenic route with rubber.

The game combines the feel of impulsive, mission-based sandbox titles like Grand Theft Auto and Tony Hawk with loose, forgiving, driving mechanics—making for disposable, whimsical racing with a persistent career and surprisingly good online mode. Every major intersection in the city is a gateway to a racing event. Spin your wheels at a stoplight and you'll activate a point-to-point race or one of four other variations on the standard sprint: Road-rage events have you side-swiping a set number of opponents within a time limit, stunt runs are all about racking up points with long drifts and high jumps, and in our favorite, "marked man," you'll try to escape a set of ominous black sedans before they can smear you into the median. There are vehicle-specific challenges, too, and as you spend more time in Paradise City, you can earn the keys to rival cars roaming the streets by pushing them off the road.

Some cars earn a boost from stunts, others from banging against other vehicles and objects in the environment, and still another type gains it by just maintaining a high speed.

When you understeer a turn (Burnout's sluggish map-guidance interface is one of its only shortcomings), you're treated to a slo-mo sequence of your coupe compressing into a steel accordion. You'll never see a pre-rendered animation—plow into a passenger van, pole, or unlucky bus near top speed, and the game catches each frame of your chassis's crunch from a cinematic angle. These scenic crashes don't affect your car's performance, and they're an anchor for the game's forgiving, unfrustrating design.

Seamless presentation is one of Burnout Paradise's best qualities. Criterion keeps the experience accessible: Loading screens are a rarity, the player's stats and best times are all recorded alongside an excellent in-menu city map, and hopping online is a matter of two keystrokes, where you can roll through events or "freeburn" with up to seven other players. The PC release bundles all the updates the console version has seen in the last year: a night-day cycle and dynamic weather, new online game modes, and a handful of motorcycles to hop on when you get tired of four wheels.

Burnout Paradise is a memorable arcade racing experience. What holds it back an rpm or two are the relatively predictable events—after you've won 20 or so challenges, the lack of more dynamic content (police, racing factions, tournaments, or multi-race events) makes the single-player seem tedious. Once you've explored the city enough to get a feel for it, Paradise loses some of its charm—busting over a dirt ramp and power-sliding through oncoming traffic as you round a blind corner into a telephone pole is spontaneous only the first few dozen times. –EVAN LAHTI

Bikes! No, you can't whip chains at passers-by like in Road Rash, but the choppers are a good wheelie-popping diversion when four-wheeling gets old.

BURNOUT PARADISE	VERDICT 8
+ NO-FAULT	**– DEDUCTIBLE**
Impulsive, pick-up-and-play appeal with addictive progression and persistency.	No multi-race events; can become predictable.

$40, www.burnoutparadise.com, ESRB: E

Warhammer 40,000: Dawn of War II

A grand strategy-RPG hybrid as beautiful as it is bloody

Fans of Warhammer 40,000: Dawn of War might feel burned by the barely recognizable sequel to their old favorite, but going in without expecting it to be yet another typical real-time strategy game is extremely rewarding. That's because DoW II is actually two excellent games in one. Both have outstanding graphics and animation, a complete lack of traditional RTS base-building, and strong tactical gameplay, but the single-player/co-op campaign mode and multiplayer experiences are very different.

In single-player, you command a group of four marine squads (or two each in two-player co-op) in a campaign to defend sub-sector Aurelia from invasion by Orks, Eldar, and Tyranid forces. Without the typical emphasis on base-building, the game feels more like an action RPG. For example, squad leaders level up and never die (they can be revived after their life is depleted). The squads can also be equipped with Wargear to make them more powerful.

There are tons of opportunities to customize your team, from which three of the five available squads you choose to take on a mission, to how you spend their earned skill points when they level up, to what Wargear you choose to equip them with. Each playthrough changes based on your choices.

Those choices lead to some impressive action, like slamming jump-jet assault marines into a group of Orks and sending them flying, or using your scouts to snipe a large Tyranid from a safe distance, severing the psychic link to the smaller beasts and turning them against each other.

In the single-player campaign, the focus is on using your Space Marines' special abilities to maximum lethal effect.

The missions tend to become tedious, and the laborious Space Marine dialogue makes you reach for the Escape key, but continue forward and you unlock new abilities and earn new equipment.

Playing in co-op (which works smoothly over Games for Windows Live) lets you focus your attention on just two squads, allowing you to manage their abilities even more efficiently and in coordination with your teammate over built-in voice chat.

Multiplayer changes the rules dramatically and comes without any training wheels attached, so learning to play—especially as the Eldar, Orks, and particularly the unintuitive Tyranids—is not for the casual player. It is, however, worth learning for its tactical, location-capturing gameplay. The action is centered on taking and holding Victory Points on the map (similar to Relic's Company of Heroes multiplayer), which causes intense fighting for control of neutral ground rather than the typical base assault. Placing your units behind cover for increased defense makes using the terrain to your advantage (and destroying it to deprive your enemy) a key part of gameplay, something not typically seen in RTSes.

DoW II changes the rules of the typical RTS enough to make both modes a refreshing experience without becoming completely alien to strategy players. Even those with zero interest in the rather goofy Warhammer fiction will appreciate this new approach.

—DAN STAPLETON

Mastering the other races in multiplayer isn't easy, but battles are epic.

VERDICT **9**

WARHAMMER 40,000: DAWN OF WAR II

+ NAIL ON THE HEAD	– NAIL IN THE HAND
Amazing graphics and Wargear loot enhance two modes of engaging tactical gameplay.	Campaign dialogue gets annoyingly aloof. Some missions are repetitive.

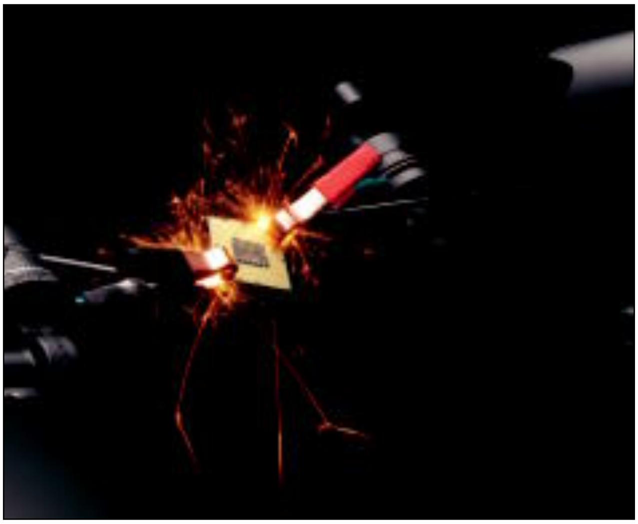
$45, www.dawnofwar2.com, ESRB: M

LAB NOTES

A Tough Little Chip

Smoke, heat, and jumper cables didn't kill our Core i7

GORDON MAH UNG
SENIOR EDITOR



Our April cover story on overclocking the Core i7 required that we sacrifice a CPU to the gods. When our art department tried to get one of my Lab samples to fry, I balked and told 'em to get their own!

Art Director Natalie Jeday did just that, and two days later, a new boxed Core i7-920 arrived. She clamped a set of jumper cables to the proc, then attached a pair of pyrotechnic sparklers to it. More than three boxes of sparklers later, we had our shot, and Natalie handed me the most abused processor I've ever seen. Stained black and covered with soot and chemicals, it looked like a total write-off. Before tossing it though, I scrubbed both sides of it with ArctiClean and dropped it into a Core i7 board. I wasn't surprised when it didn't boot. Then I saw that I had put the RAM in the wrong slots. A quick reconfiguration and reboot, and, incredibly, the burned up little proc still worked! So maybe land-grid arrays truly are tougher than pins after all.

MICHAEL BROWN
EDITOR AT LARGE

The CyberPower Extreme M1 (page 74) is very similar to the Alienware M17 we panned in March for pathetic FEAR performance. We've since discovered a flaw in our FEAR benchmark, so we've asked Alienware to send us an M17 for reevaluation. We'll post the results and an update to the review online.

WILL SMITH
EDITOR-IN-CHIEF

This month, I spent countless hours experimenting with different hardware for our cover feature. I was looking for the slowest, quietest machine that could play high-definition video stored locally or on the web. From nettops to hardback book-size wonders, it was an informative experience. For now though, the best thing going is a good, old-fashioned PC.

NATHAN EDWARDS
ASSOCIATE EDITOR

This month brings two fairly substantial hard drive milestones: Western Digital's 2TB Caviar Green, the first consumer 2TB hard drive, and Seagate's 1TB 7200.12, the first two-platter 1TB drive. The Seagate offers a nice speed bump, bringing it nearly on a par with the WD Velociraptor in sustained reads/writes, while the Caviar Green is the first in what will be a spate of 2TB drives.

KATHERINE STEVENSON
DEPUTY EDITOR

I'll confess, I've gone the last several months on a new PC without a backup plan. Having copied all my files to an external drive in the process of migrating to the new rig, I was feeling somewhat secure—until I realized how much time had passed. I'm happy to report that now *all* of my data is backed up, with future backups scheduled.

NORMAN CHAN
ONLINE EDITOR

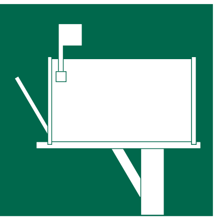
After getting tired of synching my iPhone to my PC every morning to mix up my workplace playlist, I set up an Apache server with netjukebox to stream my entire collection straight to my desk at the office. Now I'm looking for more ways to use my home server; setting up an FTP server is the next step. Pass along any tips to norman@maximumpc.com!

We tackle tough reader questions on...

Understanding Copyright

HyperTransport

Ripping Dolby 5.1



Making Sense of HyperTransport Speeds

I've noticed that all the AMD790FX/GX motherboards (both AM2+ and AM3) support 2,600MHz HyperTransport, but the new AMD Phenom II X4 chips run a 3,600MHz HyperTransport. Does this affect the overall performance of the Phenom II processors, since they are running at a HyperTransport bottleneck of roughly 28 percent? Geeks around the world want to know.

–John Frederiksen

Senior Editor Gordon Mah Ung responds: You're seeing a disconnect in how different vendors refer to the HyperTransport speeds. AM2+ and AM3 motherboards are rated for HyperTransport 3.0 speeds at up to 2.6GHz, or 2,600MHz. Since HyperTransport is double data rate, that's 5.2GHz, or 5,200MHz. For some reason, when people refer to the HyperTransport speed of the CPU itself, they use the doubled speed, such as 3,600MHz (for 1,800MHz, or 1.8GHz), or 4,000MHz (for a 2GHz proc). Since the memory controller in a Phenom II is in the CPU itself, the only high-bandwidth data going from the CPU to the chipset would be for the GPUs in the PCI-E slots. I doubt that we're anywhere near saturating the available bandwidth today.

Copyright Correction

I enjoy reading each monthly column about copyright matters (Byte Rights, QuickStart), and they have all been very good. It seems that the February column mixes up two different (U.S.) copyright issues: out-of-copyright works and orphaned copyrights. As I understand it, anything written before ~1923 is out-of-copyright and in the public domain, along with certain others created after that date that never had copyrights renewed, or any that the copyright owner has released to the public domain. These are fair game for any party to publish for free or for profit (with no royalties), and nobody, including Google, is a "default collecting society," and no congressional oversight is necessary.

Orphaned copyrights are another matter. I believe these are works from about 1923-1963, still under copyright, where the work has no remaining commercial value and/or where the right owner cannot be identified. These works present a unique challenge and opportunity. If Google has arranged with major publishers to offer a large number of these books, I'm happy to see these heretofore hidden treasures made available once more. Not the perfect way to get it done, but a move in the right direction. I don't know how many other outfits have tried to work with these publishers, so how can I complain about Google? I don't like to see a single provider of this material, but I don't know what other option exists.

This still leaves out those many copyrighted works where the copyright owner isn't readily identifiable. I imagine these remain orphaned and nobody will touch them. As I recall, Stanford Law School professor Larry Lessig was promoting legislative action that would require a $1 fee to renew these copyrights. This would go far to get some of these abandoned works back to the public.

Of course almost everything since about 1963 remains under copyright and may remain so in perpetuity if recent trends in copyright legislation continue. A limited copyright of reasonable duration, as envisioned in the Constitution, is a much preferable approach.

–Bruce Thomas

NOW ONLINE

Visual Retrospective of PC Data Storage

Modern PC users have it easy when it comes to keeping their data portable. We have a plethora of high-capacity formats—ranging from USB keys to Blu-ray discs—that can hold gigabytes of documents and media on the go. But life wasn't always so easy for the computing road warrior. Read our comprehensive time line of data storage devices—beginning with the IBM punch card—at http://tinyurl.com/dyw8ko.

Contributing Editor Quinn Norton Responds: Bruce, you have caught an error that slipped by me, even after a couple more readings. I of course meant *in*-copyright books, since a collecting society for public domain works makes no sense at all. Thank you for noticing and bringing it up.

As for orphaned works, you have the gist of it, though I think Google's de facto control over orphan books is more harmful than it seems at first glance. The deal is exclusive and grants Google a lot of control over the fates of these works, as well as likely taking the wind out of the sails of actual reformers like Brewster Kahle and Larry Lessig. In fact, it's so much control that I suspect it will run afoul of antitrust laws in the long run.

Maintaining Dolby 5.1 Integrity

I was reading the DVD ripping article in the March 2009 issue, and I applaud you for recommending the HandBrake software for encoding DVDs to high-quality H.264 files. I've tried a number of freeware tools, and this one by far is the easiest to use and yields the best quality. I was surprised, however, at your casual mention of down-mixing a Dolby 5.1 surround track to ProLogic II for the PS3. Anyone with a nice home theater knows how important the sound is to the movie-watching experience, and throwing away the discreet 5.1 mix is an unacceptable compromise. There are ways around the MP4 container limitation you mention for the PS3 and the Xbox 360.

ANYONE WITH A NICE HOME THEATER KNOWS HOW IMPORTANT SOUND IS TO THE MOVIE-WATCHING EXPERIENCE.

The easiest way is to start with the PS3 preset in HandBrake but use an MKV container instead, and change the audio settings to keep the 5.1 track. There are a couple of different options for playing these files on the PS3. You can use a free tool called mkv2vob (www.mkv2vob.com), which will take the MKV container and convert it into a VOB or an MPG container that the PS3 can play back without re-encoding. This process usually takes less than a minute. The other way is to use the open-source ps3mediaserver (http://ps3mediaserver.net) instead of Twonky. First of all, it's free, and second, it can use the tsmuxer engine to stream the MKV to the PS3 in a container the PS3 can recognize without losing the 5.1 soundtrack. Both options can convert DTS to Dolby 5.1 as well, and the ps3mediaserver can even convert the DTS to PCM on the fly if you're using an HDMI receiver with the PS3 and don't want to go through the lossy Dolby AC3-to-DTS conversion.

–Matt Putzel

Editor in Chief Will Smith responds: Indeed, Matt, sacrificing 5.1 sound sucks. I was looking for a relatively good, simple method to get the rip with as little opportunity for error as possible. Your suggestion is great, but another one I've heard is to use the .TS container format used on some Blu-ray and HD DVD discs instead of VOBs. The .TS container is natively supported by the PS3, so you don't even have to use mkv2vob. The only downside is that some streaming software simply doesn't know what to make of the .TS files, so your mileage may vary.

You Don't Need Glasses

In the CPU comparison chart for the Phenom II story (March 2009), the bolded numbers seem to give all the success to the Core i7-965 when a closer look shows otherwise. If I'm wrong, it's not the first time, but if you wouldn't mind taking a look, there's always a chance I might not need glasses.

–Peter K.

Senior Editor Gordon Mah Ung: Whoops. You're right, Peter. We goofed; the Core i7-940 ties with the Core i7-965 in ProShow Producer and the Everest Ultimate memory latency test.

LETTERS POLICY Please send your questions and comments to comments@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Letters may be edited for space and clarity. Due to the amount of mail we receive, we are unable to respond personally to all queries.

NEXT MONTH

COMING IN MAXIMUM PC's JUNE ISSUE

Now with Randy Quaid!

32 Essential Applications

We reveal the 32 programs and utilities we can't imagine computing without—and most of them are free!

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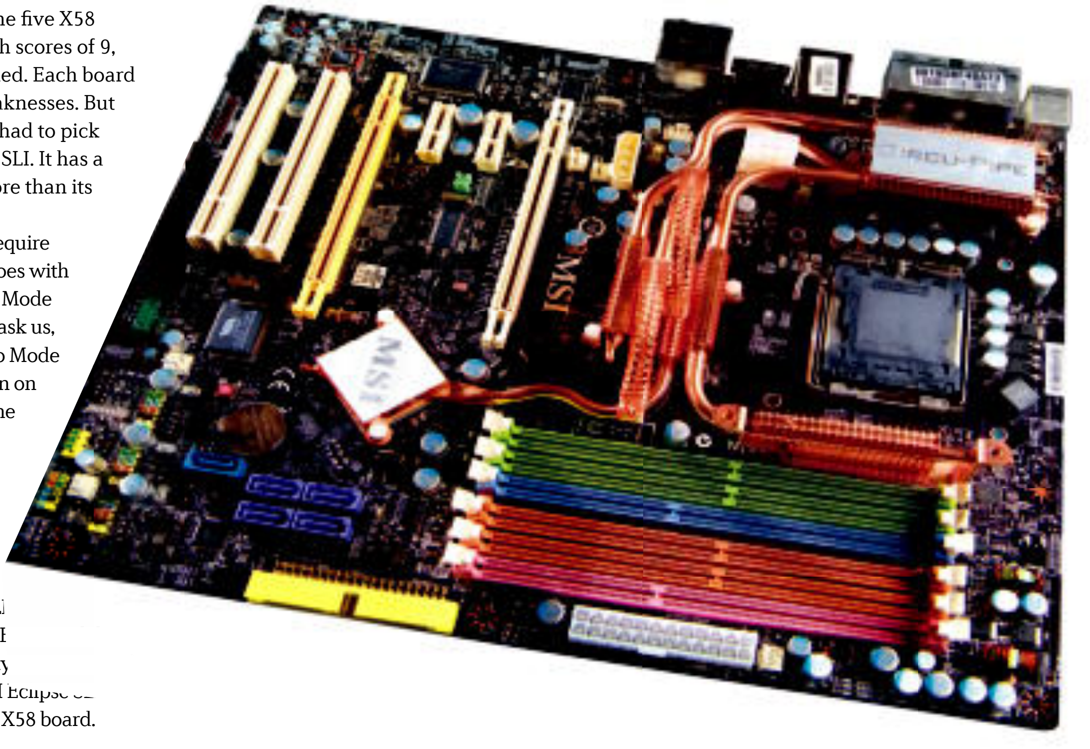
CORE I7 MOBO

MSI Eclips SLI

We've awarded three of the five X58 boards we've tested with scores of 9, so, for the most part, they're tied. Each board has its own strengths and weaknesses. But which should you buy? If we had to pick one, it would be MSI's Eclipse SLI. It has a couple of features we like more than its nearest competitors.

First, its X-Fi chip doesn't require activation of the drivers (as it does with the other boards), and its Turbo Mode works as Intel intended. If you ask us, the Rampage II Extreme's Turbo Mode is still broken, and the activation on audio drivers is plain silly (blame Creative Labs for that one). The Rampage II Extreme also is not suited for civilians, but rather for folks attempting to break overclocking records. The LANParty UT X58 is the best of the three for a real tri-SLI setup, but we're not fans of the I Flame Chiller strikes us as funky elimination, that leaves the MSI Eclipse SLI our pick for the best enthusiast X58 board.
www.miscomputer.com



THE REST OF THE BEST

■ High-End Processor
Intel Core i7-965 Extreme Edition
www.intel.com

■ Budget Processor
AMD Phenom II X4 940 Black Edition
www.amd.com

■ Socket 775 Motherboard
Asus Striker II Extreme
www.asus.com

■ Socket AM2 Motherboard
MSI K9A2 Platinum
www.msicomputer.com

■ High-End Videocard
Nvidia GeForce GTX 295
www.nvidia.com

■ Low-End Videocard
ATI Radeon 4870
www.ati.com

■ Capacity Storage
Seagate Barracuda 7200.11 1.5TB
www.seagate.com

■ Performance Storage
Western Digital Velociraptor
www.wdc.com

■ DVD Burner
Samsung SH-S223
www.samsung.com

■ Blu-ray Burner
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www.lge.com

■ Monitor
Gateway XHD3000
www.gateway.com

■ Mid-Tower Case
NZXT Tempest
www.nzxt.com

■ Air Cooler
Zalman CNPS 9900NT
www.zalman.com

■ Gaming Mouse
Logitech G5 Laser Mouse
www.logitech.com

■ Keyboard
Microsoft Natural Keyboard 4000
www.microsoft.com

■ Wi-Fi Router
Linksys WRT600N
www.linksys.com

Games We're Playing

■ Team Fortress 2
www.teamfortress.com

■ Sins of a Solar Empire: Entrenchment
www.sinsofasolarempire.com

■ Empire: Total War
www.totalwar.com

■ Burnout Paradise
burnout.ea.com

For even more Best of the Best entries, such as speakers and budget components, go to http://www.maximumpc.com/best-of-the-best

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